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# Indian Silk

## इंडियन सिल्क

The complete sericulture and silk industry journal of India

MAY 1997

# Defects in Silk Fabric





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# इंडियन

# Indian Silk

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Our dynamic research and extension wings are engaged in the upliftment of the socio-economic conditions of the sericulturists of the country and are intensifying their efforts so that the generations of tomorrow may have a bright future

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## **We Could Do Better!**

**T**he Indian sericulture industry has achieved tremendous strides during the post-independence period. The raw silk production has galloped from 1614 mt. in 1960-61 to 13,909 mt. in 1995-96 and the country could attain the status of second largest producer of silk in the world. The achievement is not an overnight miracle but a result of incessant and relentless R & D effort to evolve high yielding mulberry varieties and silkworm races, improved package of practices of sericulture, etc.

The magnitude and employment potential of sericulture can be gauged from the fact that it is practised in over 50000 villages providing gainful employment to about 59 lakh people, thus, playing a pivotal role in poverty alleviation, employment generation and arrest of rural migration. No wonder, these merits have inspired many a new state to take to sericulture and today, their contribution is nearly 14.5 % of the total mulberry area in the country.

Yet, we cannot be complacent. The twin problems of high cost of production and low quality is still plaguing the industry despite considerable efforts. Presently, bulk of our silk comes from tropical multivoltine and its quality falls

short of international standards. No doubt, we have a strong and growing domestic market that could absorb what is being produced; yet, this very favourable factor should not be an obstacle to achieve the best. There is a felt need for quality silk that enables more and more product diversification, not only to meet the export requirement but also to satisfy the domestic market.

Thus, with globalisation becoming the 'in' thing, the industry has to take drastic measures to produce high grade silk conforming to international standards. What is needed is that we should concentrate now more on vertical growth than horizontal and to harness the potentials of the existing and new mulberry varieties and silkworm races to their optimum level. The reeling and weaving sectors need immediate modernisation to ensure better and quality output. It calls for concerted and coordinated efforts from all the developing agencies not only at reducing the gap between the lab and land in technology transfer, but also to attempt better management skills. Better quality and productivity are the inevitable needs and we have to strive for achieving the same.

 **Editor**



## Letters to the Editor

### Hypothetical

The article 'Seed Crop Production' by J.P. Gaur *et al.* (**Indian Silk**, March, 1997) gives useful information such as meteorological data of different zones in the country, but appears to be hypothetical. According to the authors, different climatic zones will have the same 28°C temperature during monsoon. This cannot be true as the temperature depends upon altitude which varies considerably in our country due to the Himalayas. The article would have been informative if the authors covered the P<sub>4</sub>, P<sub>3</sub>, P<sub>2</sub> and P<sub>1</sub> seed crops.

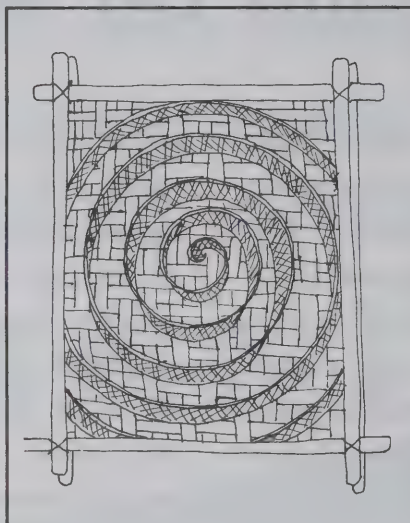
The authors suggestion, 'one piece of bread can be kept in the disinfected room and if no fungus is grown in 4-5 days, then disinfection is absolute' is somewhat unscientific. It is known fact that as soon as the thickness of the rearing bed increases, the fungi start growing and cause putrefaction, inspite of so-called 'absolute disinfection', because the mulberry leaf comes from the external environment.

S.B. Saraswat  
R.K. Pandey  
R. Kumar and  
Gargi

Purvanchal Sericulture  
Development Project  
Central Silk Board  
Varanasi (U.P.)

### Mountages-

#### Why only spirals ?



This refers to the article 'Temperature and Humidity Management during Cocoon Spinning' by B. Sarathchandra (**Indian Silk**, March, 1997). The article is quite interesting and informative.

I feel that the idea of hollow chandrikes mentioned by the author needs all the encouragement and hope, manufacturers will adopt it in the right spirit.

It may further be contemplated as to why the strips in chandriki should only be spiral and not otherwise? If the strips are arranged straight instead of spiral (Fig.), it is likely that it holds more number of worms than in the traditional ones. I hope that

the idea will be taken up by the sericulture scientists.

C. Ravi Shankara  
Senior Research Asst.

Central Silk Technological Research  
Institute, Central Silk Board, Bangalore

### Had a lot to offer

The idea of Summer Special is a good attempt to remind the sericulturists of the precautionary measures to be taken during summer rearing and the tips given therein help them to better manage the crop. The article "Temperature and Humidity Management during Cocoon Spinning" by B. Sarathchandra (**Indian Silk**, March, 1997) has provided useful information in detail. The article covers different aspects of climatic effects on the quality of the cocoons. It is helpful in creating awareness amongst the rural sericulturists. However the author should have elaborated further the demerits of chandriki getting spoilt due to draining of silkworm urine. Wet chandriki raise the humidity of the room giving way to the fast development of pathogens. It also affects the mortality of the larvae and pupa and hence, a decrease in the price for cocoons.

V. Selvaraj  
Junior Inspector

Department of Sericulture  
Thamampatty Sub Range  
Salem District, Tamil Nadu

## RESPONSES

*Do you feel strongly about any aspect of sericulture in the country ? Please feel free to write to the Editor. Besides your reactions to the articles published in **Indian Silk**, we welcome your thoughts on any aspect related to sericulture.*

# Mulberry Improvement Programmes - An Overview

S.B. Dandin

**T**he role of improved mulberry varieties has been well established in the vertical improvement of crop productivity coupled with better quality. Since mulberry is the only feed source to *Bombyx*

***Evolution of hybrid mulberry varieties suited to the agro-climatic zones of the country has been engaging the attention of the agencies involved in sericulture development for a long time. A string of high yielding mulberry varieties evolved over a period of time has contributed to the stupendous increase in leaf yield and consequent cocoon quality. A synchronisation of research efforts and extension education will go a long way in reaping the fruits of technological achievements by the sericulturists, feels the author.***



**Fig. 1. Well maintained mulberry garden**

*mori*, leaf yield and its quality has a paramount effect on cocoon harvest and total economic gain.

Unlike silkworm resources, India enjoys fairly a comfortable position in mulberry as the indigenous cultivars are endowed with good agronomical traits. Amenability to vegetative propagation, fast growth, quick rejuvenation and high biomass production capabilities of Indian mulberry cultivars has made it possible for farmers to achieve higher cocoon output. Given the best inputs, namely water and organic manure, mulberry cultivars developed in India are second to none in the world. Similarly as a biological entity, mulberry offers the best opportunities

for the breeders to achieve good success. Mulberry has some of the built-in advantages, namely high amount of natural variability and heterozygosity; dioecious/unisexual nature; alternate reproductive system and above all perennial nature with high biomass production. Making use of these naturally endowed features, breeders could achieve higher amount of success in developing improved mulberry varieties resulting in more than 250% increase of leaf yield over the last four decades. (Fig. 1 and Table 1).

## **Era of land races**

Though mulberry improvement programmes on a sound scientific





Fig. 2. Visva (DD)

the efforts made by the state sericulture department, Govt. of Karnataka, CSR&TI, Mysore in South India and Berhampore in North east India, two selections namely Kanva-2 and Mandalaya were selected respectively. Later yield trials and nutritional compositions were tested and both the varieties became popular as Mysore-5 (M-5) and Ber-S1. These varieties were tested both under rainfed and irrigated conditions and found widely adaptable to large geographical regions. Hence, efforts were made to popularize these two regional varieties.

### Planned approaches

Experiments conducted at the CSR&TI, Mysore on mutation breeding have yielded four selections, namely,  $S_{30}$ ,  $S_{36}$ ,  $S_{41}$  and  $S_{54}$ , for irrigated conditions. These selections had a yield potential of 30-35 ton/ha/year of leaves under the recommended package of practice of cultivation. Similarly, the intraspecific hybridization and back

**Table 1. Leaf yield potential of improved mulberry varieties**

Period (Decade)	Leaf yield potential (kg/ha/year)	
	Rainfed condition	Irrigated condition
1950	4,000	15,000
1960	4,000	20,000
1970	6,000	25,000
1980	10,000	30,000
1990	15,000	35,000
1995	18,000	45,000

base have started only in the early 60's, yet scientists did identify earlier some of the promising clones from the open pollinated hybrid population and also through inter-regional introductions. Mysore Local cultivar with three local types, namely "Yenne rangina kaddi" (Oil coloured stem) "Boodukaddi" (Ash colour stem) and "Sultan kaddi" (Plants introduced by Tippu Sultan) were recognized in South India with an yield potential of 10-15 mt/ha/year under irrigated conditions and 4-5 mt/ha/year under rainfed conditions. Similarly, Kajjali, a local

indica type was popular in West Bengal, the then second largest silk producer. In the temperate zone i.e., Kashmir valley, Goshorami, Tsukasaguwa and Ichinose were introduced from Japan.

These cultivars were popular till early 60's. During the mid 60's

**Table 2. Mulberry varieties recommended for cultivation**

Period	Regions of cultivation and mulberry varieties		
	South India	North East India	Jammu & Kashmir (J&K)
1950s	Mysore Local (Sultani Kaddi, Yennerangine Kaddi, Boodirangina Kaddi). Japanese grafts.	Kajjali	Goshorami, Shatut, Tsukasaguwa
1960s	- do -	Kajjali, Matigara Black	Goshorami, Shatut, Sujanpuri.
1970s	Kanva-2 ( $K_2$ or $M_5$ ), Mysore Local	Kajjali, Matigara Black Mandalaya.	Goshorami, Shatut, Sujanpuri. Tsukasaguwa, Chak majra.
1980s	Kanva-2, Mysore Local, $S_{54}$ , $S_{36}$ , $MR_2$ , $S_{30}$	Berhampore $S_1$ , TR-4, Tr-10 BC2-59, Kosen.	Selection-146, Chinese White
1990s	Kanva-2, $S_{36}$ , $S_{54}$ , $S_{34}$ , $S_{13}$	TR-10, BC-259, $S_{766}$ , $S_{779}$ , Kosen. TR-4	S-146, Ichinose, Kenmochi Chinese White
1995	Kanva-2, $S_{36}$ , $S_{31}$ , $S_{13}$ , $MR_2$ Visva. V1, $S_{1635}$ , $RFS_{175}$ X $RFS_{135}$ Promising varieties.		



cross breeding experiments conducted at the CSRTI, Berhampore could isolate four selections namely, C<sub>776</sub>, C<sub>763</sub>, S<sub>779</sub> and BC-2-59 with an yield potential of around 25 mt/ha/year under West Bengal conditions. During this period, three selections namely, Check Majra and Sujampur were isolated in J&K and MR-2 in Tamil Nadu with high yield potential. Considering the need for rainfed mulberry regions, CSRTI Mysore concentrated on rainfed selections (RFS) programme during mid 70's. During 80's, two selections namely, RFS-135 and RFS-175 were found promising with an yield potential of 10-12 mt/ha/year under rainfed conditions of South India.

#### Development of plant type concept

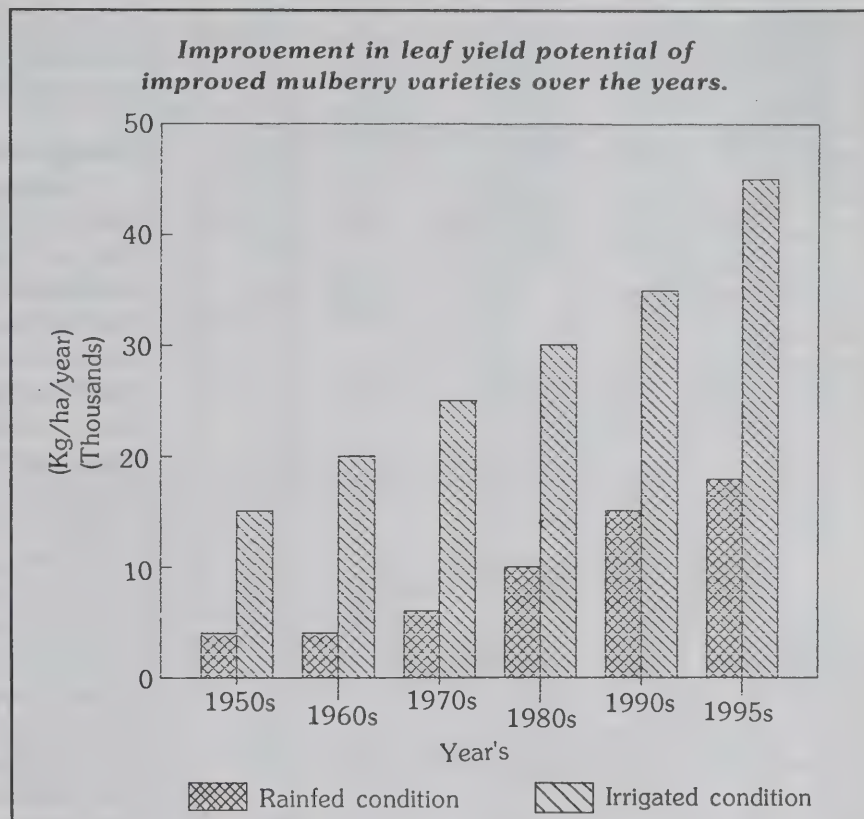
During early 80's two new and large scale approaches were initiated for mulberry improvement programmes:-

- Inter-regional exchange and testing of promising mulberry genotypes.
- Large scale inter and intraspecific hybridization programmes to combine the desirable

agronomical traits of tropical and temperate genotypes aiming at qualitative improvement of tropical mulberry varieties.

As a result of first approach, it was possible to test M<sub>5</sub> (K<sub>2</sub>) variety in Northern parts of India and selections made at CSR&TI,

Berhampore namely, S<sub>779</sub>, S<sub>776</sub> and TR series yield trials were laid out both at the Mysore and the RSRS, Kodathi in South India and at the RSRS, Jammu and Dehradun in Northern region. The second approach has made it possible for creation and testing of series of F1 hybrid populations derived from crossing the promising parental lines. Simultaneously, the strength and weakness of Indian mulberry cultivars/genotypes were also recognized and concerted efforts were made to collect, conserve and characterize the mulberry wealth for future harnessing. Large amount of temperate genepool was also introduced in the country. Characterization of the genepool has resulted in a plant type concept with definite and quantified traits to be incorporated into an ideotype of mulberry. Yield parameters were defined, quantified and methods for feeding standardised. By the mid 80's, the superiority of improved mulberry



**Fig. 3. Chinese white**



Table 3. Characteristics of improved mulberry varieties\*

Characters/Varities	Mysore Local	M <sub>5</sub>	S <sub>20</sub>	S <sub>36</sub>	S <sub>34</sub>	RFS <sub>135</sub>	MR <sub>2</sub>	S <sub>13</sub>	S <sub>34</sub>	Berhampure Local	S <sub>1</sub>	S <sub>799</sub>	C <sub>776</sub>	BC-2-59	Tr <sub>10</sub>	Goshoerami Ichinose (exotic)
Inflorescences	Globular spike	Globular spike	Globular spike	Globular spike	Cylindrical spike	Cylindrical spike	Globular spike	Cylindrical spike	Cylindrical spike	Globular spike	Cylindrical/Globular spike	Globular spike	Cylindrical/Globular spike	Globular spike	Globular spike	Globular spike
Flowers	Unisexual, Male or Female, on separate plants (Dioecious)	Unisexual Female	Unisexual Female	Unisexual Female	Unisexual Female	Unisexual Male	Unisexual Female	Unisexual Male and Female	Unisexual Male and Female	Unisexual Female	Unisexual Male and Female	Unisexual Female	Unisexual Male and Female	Unisexual Female	Unisexual Female	Unisexual Female
Ploidy level/Chromosome number	Diploids 2n=28	Aneuploids 2n=28	Diploids 2n=28	Aneuploids 2n=28	Diploids 2n=28	Diploids 2n=28	Diploids 2n=28	Diploids 2n=28	Diploids 2n=28	Diploids 2n=28	Diploids 2n=28	Diploids 2n=28	Diploids 2n=28	-	Triploids 2n=3X=42	Triploids 2n=28
Rooting (%)	>90	>80	>55	>48	>60	>74	>65	>80	>75	>80	>70	>67	>80	>67	>57	<02
Average single shoot ht 70 days after pruning (cm)	162	138	118	131	127	139	120	169	163	164	157	122	175	140	160	110
Internode length (cm)	3.7	4.2	3.3	4.0	3.9	4.4	4.2	3.7	3.6	4.2	4.4	4.2	4.7	4.2	4.6	4.0
Weight of 100 fresh leaves (g)	245	400	456	518	487	599	372	365	342	388	269	317	372	503	526	350
Leaf water content (%)	67-71	68-76	70-74	67-76	70-76	72-80	72-77	75-76	74-76	73-75	69-75	74-77	70-73	75-78	76-80	72-75
Leaf water retention after 6 hours of harvest (%)	77	81	85	84	87	86	86	88	88	83	75	82	85	87	88	81

\* Based on preliminary evaluation, at the KSSRDI, Bangalore

varieties in biomass production and leaf yield was established beyond doubt along with the growing quality consciousness.

### Quality consciousness and LCR concept

Realizing the fact of higher Leaf Cocoon Ratio (LCR) emphasis was given to standardize the leaf quality parameters and methods for evaluation. Based on the enormous information and knowledge generated, a few standard methods were developed for quality evaluation. Methods being adopted for leaf quality assessment in Japan and China were also critically examined for their acceptability under tropical conditions. Comparative quality evaluation through both biochemical analysis and feeding trials (bio-assay) were initiated countrywide. Similarly, the plant types suitable to various levels of moisture regimes (ASM) soil type and temperature regions were also well recognized. These investigations indirectly led to the quality concept for chawki requirement. Cultivar S<sub>36</sub> was considered best for chawki worm rearing and rearers were informed accordingly. Large scale experiments were started for evolution of mulberry coupled with garden management practice exclusively for rearing young worms.

Work was under progress with respect to testing of new and promising genotypes and the wider adaptability M<sub>5</sub>, MR<sub>2</sub>, S<sub>776</sub>, S<sub>779</sub>, TR<sub>10</sub>, TR<sub>4</sub> etc. Mulberry varieties recommended for different sericultural regions, their biological features and yield parameters are given in tables 2 and 3.

### Perfection and AICE programmes

Mulberry breeding approaches especially the controlled hybridization and polyploidy breeding aimed at evolution of triploids, which were started during middle and late 80's, have resulted in isolation and testing of very high yielding and good leaf quality genotypes, namely Viswa (DD) V<sub>1</sub>, S<sub>1635</sub>, etc., which have a yield potential of more than 45 ton of leaf ha/year (Table-4). The yields of these cultivars are comparable to the highest yields of tropical China i.e., Guangdong province where 70 mt of total biomass production is reported (i.e., 42 mt of leaf/ha/yr.). However, the quality aspects like leaf moisture, proteins and total carbohydrates were of lower order which is mainly attributed to the level of Available Soil Moisture (ASM) and organic carbon content.

**Table 4. Important parameters of recently evolved mulberry varieties**

Mulberry varieties Parameters	Rooting (%)	Wt. of 100 fresh leaves (g)	Leaf water content (%)	Leaf yield potential* (Kg/ha/yr.)
Viswa (DD), South India	80%	527	73.78	56.5
V <sub>1</sub> (Victory -1)**, South India	94	450	78.85	67.0
S <sub>1635</sub> , West Bengal	86	453	74.78	50.73
Chinese white**, J & K Region	90	410	74.70	55.0
RFS 175, South India (Semi irrigated condition)	89	488	73.40	48.40

\* Potential indicated as per the experiments conducted at research stations

\*\* Calculated data based on secondary source of information

Good results are being realized from well maintained gardens with assured irrigation facilities. Among such farmers, leaf yield to sustain 500 DFLs (10 box) per crop per year over an area of 0.4 ha of mulberry garden is possible. This amounts to yield of 20-25 ton of leaf /yr. for 0.4 ha which is the world record.

Realizing the yield potential and wider adaptability of new genotypes, an all India Co-ordinated Experiment in Sericulture (AICE) was launched by the Central Silk Board to enable the testing of improved/evolved genotypes at different locations having varied agro-climatic conditions. This experiment covers four agro-climatic zones, 22 testing centres with 16 entries developed by various organizations throughout the country. This programme is likely to be concluded by 1997 and could result in isolation of region-specific mulberry varieties.

After attaining the highest leaf yield level with moderate quality, Leaf : Cocoon ratio (LCR) of 20:1 was possible. To realize these lab achievements at field level and also at the Technical Service Centres (TSC) level, HRD programme of trained mulberry breeders was taken up. Many scientists were

sent to Japan and China to upgrade their knowledge in mulberry breeding. With the high yield potential of newly evolved/tested varieties like V<sub>1</sub>, Viswa (DD), S<sub>1635</sub>, RFS-175, it was possible to achieve 350% improvement over the base year (Table-4).

### Future needs

After proving the highest leaf yield potential of Indian mulberry varieties, the spread of these varieties to the field is still not satisfactory. This is mainly because of non-involvement of extension staff at the time of field testing

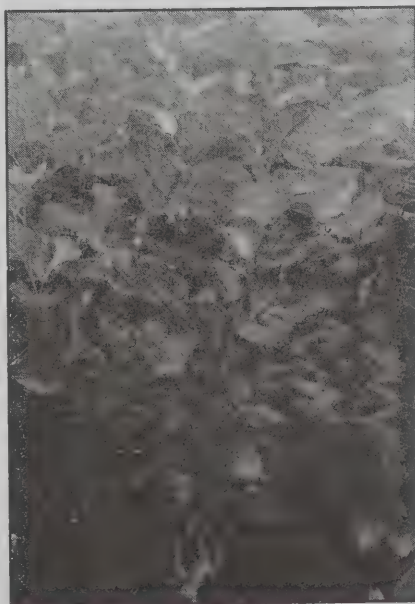


Fig. 4. S<sub>1635</sub>

mechanisms; frontline demonstration and also well developed seed production farms. As a result, the non-availability of planting material at a given time is hindering the progress. However, concerted efforts are being made in this direction. It is high time to establish nucleus seed farms; seed multiplication farms and large scale nurseries for multiplication and raising planting material. This is not a small task and needs closer co-ordination between central/regional and state organizations. A serious thought has to be given in this direction.

On the breeding side, the two proven and result-oriented approaches, namely, controlled hybridization and evolution of triploids be given higher priority so that new mulberry strains endowed with specific traits could be developed. The modern techniques like RFLP, RAPD, DNA finger printing, etc., could be used for genetic analysis of the genotypes. Another area which needs the attention of breeders is evolution of moisture stress tolerant/resistant strains, as water is not only a scarce and costly input but also a major limiting factor for sustained crop cultivation. In this direction, understanding of biochemical and physiological mechanisms associated with drought tolerance/resistance at sub-cellular levels is imperative.

Finally, variety alone cannot do miracles. High yield potential presupposes optimum nutrition and moisture input for prosperity. Both aspects must go hand-in-hand and this will definitely reduce the production cost and scales up the vertical improvement.

*The author is with Karnataka State Sericultural Research & Development Institute, Bangalore.*



# Irrigation and Summer Management of Mulberry Garden

R.K. Mishra, Y.R. Madhava Rao, Ramakant and R.K. Datta

**M**ulberry productivity and quality could be improved through inputs like fertilizers and irrigation. Further, to meet the increasing demand of silk, stress has to be laid on increasing the qualitative vertical productivity besides horizontal expansion of

---

***In the March, 1997 issue, Indian Silk published a series of articles on Summer Management of sericulture. In continuation, we are presenting a write-up on the importance of irrigation management and water conservation during summer.***

---

the mulberry gardens. In both the conditions, irrigation has to play a significant role to achieve the desired goals. With the development of cultivation technology for mulberry under irrigated conditions, the productivity of mulberry can be increased manifold. Presently, more than 60% of total area under mulberry is irrigated. This



not only has increased the productivity but also the leaf quality which ultimately has improved the raw silk productivity to 47.50 kg/ha (1995).

Higher production of mulberry, like any other crop is largely influenced by adequacy of water supply which is made available either by well distributed rainfall of sufficient quantity or by scheduling supplemental irrigations at proper time and in amounts. This is more important in view of the poor and erratic rainfall. Thus, the dependence on available water resources (surface and ground water) is ever increasing.

The summer months in the southern tropics are characterised by high temperature (28.3-

37.5°C), low relative humidity (65%) and intense solar radiation. The average maximum temperature increases during the post-rainy period (January onwards) till April-May, and thereafter, it declines after June with the advent of monsoon. Response of mulberry to water inputs, especially during summer months, in terms of yield is substantial. However, it is proving to be a costly input due to water scarcity especially by way of depleting ground water resources and high energy requirements. Indications are that ground water in many areas where sericulture is practised is getting converted from white (upto 65% exploitation) to black (>85% exploitation). In many places,

especially in Tamil Nadu and many parts of Karnataka every year the farmers have to deepen their wells to get water.

### Present practice and drawbacks

Flood irrigation is the most common method practised by the farmers. Often, irrigation is given at prolonged intervals when the soil moisture reservoir in the root zone gets almost depleted. Irrigation is provided by application of water in excess quantities so as to saturate the soil to a particular depth, often leading to temporary impoundings, which leads to periodic hinderance in aeration and the long dry period causes impediment to root growth and normal functioning.

Such prolonged irrigation also leads to improper or poor soil nutrient utilisation. Nutrients are absorbed better when they are in solution form. The nutrient-water solution clings to the soil particles. Lower the moisture content of soil, greater the cling. To absorb water, plant must overcome the soil moisture tension. Thus, as the soil moisture decreases and its tension increases, plants work harder to extract the water. With the depletion of water, plants are not able to get the water and nutrient they need for growth as the nutrients in soil cannot be adequately absorbed and plant physiological functions get affected adversely. Thus, a direct relationship exists between crop yields and soil moisture tension which in turn is related to soil moisture status. Over watering also results in washing away of nutrients below the root zone (percolation losses), out of the reach of the plant. It also creates water-logging, restricting supply of oxygen to the plant roots. This,

many a time, promotes root diseases development too.

### Irrigation management during dry period

*Quantified application of water* : The availability of water in the root zone depends upon the soil type. Each soil type has a maximum capacity to hold moisture against the gravitational pull which is termed as field capacity. In general, a lot of water is lost as percolation loss in surface irrigation method, especially when flood irrigation is followed. It is at this stage of soil moisture (field capacity), that availability of water and nutrients is maximum to the plants.

Providing water just equivalent to field capacity not only ensures its optimal utilization but also saves a lot of water from getting lost to deeper layers. In fact, this provides information on actual water required for good plant growth.

Table 1 provides a general indication about the irrigation water requirement to keep the soil in available water status for different textural groups.

Since mulberry is cultivated in a wide range of soils and the root system goes to a depth of about one mtr, the figures in Table 1 can be considered, in general, for standardizing the water requirement for mulberry also.

Table 1. Soil and irrigation requirement		
Soil type	Field capacity (% by wt)	Available soil water (cm/m depth)
Sandy	5-10	5-10
Sandy-loam	10-18	9-16
Loam	18-25	14-22
Clay-loam	24-32	17-25
Clay	32-40	20-28

Table 2. Irrigation frequency.

Months	Evaporation loss (mm/day)	Frequency of irrigation (days)
Jan	3.4	14
Feb	4.1	12
March	4.7	10
April	5.5	8
May	4.8	10

*Climate oriented irrigation scheduling*: Many climatological factors operate singly or in combination influencing uptake of water by plants to meet their needs. Air characteristics like temperature, RH, sunshine and wind speed influence water loss by plants. The climatological data can be used to find out water requirement of crops and to schedule the irrigation. Scheduling is an important step in water management in view of minimising the loss through various factors and to increase the water use efficiency.

Studies were conducted at CSRTI, Mysore to develop a schedule irrigation, based on climatic variabilities. The daily evaporation loss of water, which is directly influenced by prevailing climatic condition, was considered for the purpose. The main idea was to prevent the water level in soil falling below the 50% of the available water range between two irrigations. Plants suffer physiologically due to stress created when water level falls below. Based on daily evaporation losses, an irrigation frequency is suggested (Table 2).

Studies indicated that leaf yield and quality (leaf moisture and protein) have increased with the increase in frequency of irrigation (Table 3).

*Land management for uniform waste application*: Uniform application of available water over



**Table 3. Frequency of irrigation vs. leaf yield.**

Irrigation frequency (days)	Leaf yields (kg/ha)	Leaf moisture (%)			Leaf protein (%)		
		Chawki	Medium	Coarse	Chawki	Medium	Coarse
14	6803	75.95	74.09	71.73	3.74	3.07	3.02
11	7354	76.78	74.42	72.33	3.77	3.06	3.03
9	7840	78.31	75.38	72.60	3.86	3.09	3.03

\* For crop during March-May.

the entire area of the garden is a pre-requisite for effective water management. Thus, as first step, the garden should as far as possible, be levelled for the purpose, especially between the plant rows for uniform distribution of water. Thereafter, following strategies should be adopted.

**Compartmentalization of plot:** The garden should be converted into smaller blocks, which can be better managed. In flood irrigation, by the time the water reaches the last plant of the plot, the area near the channel gets over saturated and the area away from channel remains under irrigated. Thus, converting the plot into smaller blocks makes it convenient for proper and uniform irrigation.

**Irrigation system:** At present, flooding of garden is the commonly adopted method of irrigation. The drawbacks of the system include non-uniform application of water, impounding in certain pockets, loss of water due to percolation and leaching of nutrients due to excess water application. In the present era of overall irrigation water shortage, adoption of the system is not practical. Thus, it is highly imperative to adopt efficient method like ridge-furrow system of irrigation. This system ensures uniform application of water, besides reducing percolation losses and impounding effects. Even, with lesser water, a large area can be irrigated. This method

also ensures effective application of fertilizers.

Further, in the event of poor water source, alternate furrows should be made for irrigation. A single furrow serves water to two rows of mulberry, effectively.

One of the many advantages of furrow system of irrigation is that it also facilitates drainage in harder soils.

**Improvement of texture of soil:** Water holding capacity of a given soil is directly related to the status of its texture and organic matter. Since the structure and texture of soil is fixed, the water holding capacity can be further improved by application of large quantities of organic matter. The organic matter is colloidal in nature and can retain the moisture for a longer time. With the increased organic content in the soil, the physical property will get altered and finally the water retention capacity is increased. Due to increased water holding, the mineral nutrients will also be held in the root zone and utilized by the plants. The number of irrigation per cropping cycle will also decrease.

For the purpose, slight alteration in the application timing of FYM/organic matter is required. The FYM should be applied in two splits, first during monsoon and the second dose after 3rd harvest (Jan-Feb) so that the effect of the same remains for a longer time in the soil.

## Shift in cultural practices

**Avoiding intercultural operations:** The intensive intercultural operations like digging or ploughing of the gardens should be avoided during the irrigation period. Ploughing leads to loosening of soil which results in high evaporation of moisture from soil. It also makes the top soil vulnerable to erosion by wind, which carries along with it, the precious organic matter. Irrigation can be continued in the existing furrows.

**Avoiding pruning of gardens:** Bottom pruning of the gardens especially where shoot harvesting is followed, should be avoided during summer months (March-May). Instead, top or middle pruning should be resorted to. This will prevent the sun rays falling directly on soil surface and in turn reduce the evaporation loss. Further, the availability of leaf will be early and number of irrigations required during the period will reduce. In case of bottom pruned garden, one immediate irrigation is a must for facilitating the sprouting of latent buds. However, a large part of the water applied is lost by evaporation, in the absence of the foliage. Thus, by adopting middle/top pruning, irrigation input will be reduced and effective utilization of the soil moisture will be ensured. This in turn will save water.

The adoption of the above scientifically proven technologies and suggestions, will lead to improvement in productivity and leaf quality of mulberry in summer months/dry periods. This will improve the silkworm rearing performance and ultimately increase the cocoon production.

**The authors are with Central Sericultural Research & Training Institute, Mysore.**



# Soil Sampling - Why, How and Where?

Mukund V. Kirsur

**E**ffective soil management forms a core factor in ensuring good yield of quality mulberry leaf. Inadequate plant nutrition not only affects plant growth and yield but also its quality. As soil is the main source of nutrition for plants, its assessment is quite important to find out its status to recommend the corrective/reclamative measures, if needed. Soil testing is essentially done before taking up any crop. In case of perennials like mulberry, it should be carried out periodically in the standing crop also for possible corrections. In other words, the very purpose of soil analysis is to keep the soil healthy, so that harvests would be rich with high quality leaves. That is why, soil testing laboratories are also called "soil health centres". The first step towards soil testing is proper soil sampling.

## Why soil sampling ?

Soil samples are collected in order to carry out soil testing for the following reasons :

- \* To find out the quantity of essential available plant nutrients in the soil.

- \* To determine soil conditions like acidity, salinity and alkalinity. Such sick soils can be corrected by applying chemical amendments.

- \* While inadequate application of fertilisers affects the yield and quality, excessive application

results in wastage of fertilisers. Recommendations based on soil testing result in deciding the right type, dose and method of application of fertilisers and thus, facilitate the maintenance of the fertility status of the soil

- \* To determine various physical properties of the soil.

- \* Fertiliser application based on the soil testing, not only minimises the wastage of fertilisers, but also ensure efficient use of fertilisers, thereby, saving a considerable amount of money for the farmers.

Based on the results of soil testing, suitable reclamatory/corrective measures can be adopted to improve the soil conditions conducive for the crop to be raised.

## How to collect?

As the sample should truly represent the entire field/garden alongwith its variations, it should be collected properly and carefully. The correct procedure is as follows :

- \* Based on the soil type, elevation and appearance (which are visibly different), the land is divided into sub-plots.

- \* Samples should be collected from 3-5 spots in each sub-plot or unit. This number depends on the size of the sub-plots. Before collecting samples the spot should be cleared off weeds, dirt and other unwanted material. To obtain

proper results, samples are collected from three levels i.e., from surface, at 0-30 cm and 30-60 cm. depth. A quantity of about 250-500 gm. of soil should be collected from each spot.

- \* A 'V' shaped pit of 30 cm depth is dug with a spade or suitable appliance at the sampling spot. About 250-500 gm of sample should be collected by evenly scraping the sides of the pit. This is the sample for 0-30 cm level. After widening the pit and clearing the soil, again a 'V' shaped pit is dug for the next level of sampling i.e., 30-60 cm. Again 250-500 gm of soil, is collected as explained above. After this a composite sample is to be prepared.

- \* Out of the samples collected at different levels, only three composite samples are to be prepared for testing. Therefore, samples of each level should be thoroughly mixed, separately. Before mixing, pebbles and debris from the samples should be discarded. Now, sample is spread and divided into four equal parts. The two opposite quarters are discarded. Remaining two quarters are mixed thoroughly. This process is continued till the sample is reduced to 500-750 gm. Then these samples are dried in the shade. Samples of each level are packed separately in polythene/cotton bag and closed. Each bag is tied with a label containing following information:



- \* Sample number
- \* Date of collection of sample
- \* Name and address of farmer
- \* Identification of the field (Survey No.)
- \* Type of land (irrigated, rainfed, water logged etc.)
- \* Topography
- \* Source of irrigation
- \* Proposed crop/variety
- \* Details of manures and fertilisers applied
- \* Any other information

- irrigation.
- \* Don't collect the sample after burning of crop residue.
- \* Don't collect sample from the recently manured or fertilised fields
- \* Don't collect the samples near bunds, irrigation canals and from shady places, threshing floor, manure pits and marsh spots etc.

tural Universities, agriculture/horticulture departments, private agencies, fertiliser companies etc. have established soil testing laboratories all over the country. They offer soil testing services, free of cost or at a nominal rate. In addition, many of these organisations have mobile laboratories which help the farmers to get their soil tested in their village itself.

The addresses of soil testing laboratories (both government and private) functioning in the southern states of Andhra Pradesh, Karnataka, Kerala, Pondichery and Tamil Nadu are given in the Table.

### Where to get the soil tested ?

#### Some don'ts

- \* Don't collect soil sample immediately after rains/

Realising the importance of soil testing the research institutes of the Central Silk Board, Agricul-

**Table: List of soil testing laboratories (government and private) in the southern states of Andhra Pradesh, Karnataka, Kerala, Pondichery and Tamil Nadu**

Location	Address of the Soil Testing Laboratory	Location	Address of the Soil Testing Laboratory
<b>ANDHRA PRADESH</b>			
Adilabad	Assistant Director, Soil Testing Laboratory, Adilabad	Nizamabad	Assistant Director, Soil Testing Laboratory, Nizamabad
Amadalavalasa	Assistant Director, Soil Testing Laboratory, Amadalavalasa, Srikakulam Dist.	Nellore	Assistant Director, Soil Testing Laboratory, Nellore
Anantapur	Assistant Director, Soil Testing Laboratory, Anantapur	Ongole	Assistant Director, Soil Testing Laboratory, Ongole, Prakasam Dist.
Anakapalli	Assistant Director, Soil Testing Laboratory, Anakapalli, Visakhapatnam Dist.	Rajendranagar	Assistant Director, Regional Soil testing Laboratory, Rajendranagar, Rangareddy Dist.
Bapatla *	Assistant Director, Regional Soil Testing Laboratory, Bapatla, Guntur District	Samalkot	Assistant Director, Soil Testing Laboratory, Samalkot, East Godavari Dist.
Cuddapah *	Assistant Director, Soil Testing Laboratory, Cuddapah	Sangareddy	Assistant Director, Soil Testing Service, Sangareddy, Medak Dist.
Guntur	Assistant Director, Soil Testing Laboratory, Guntur	Tadepalligudem	Assistant Director, Soil Testing Service, IADP, Eluru, West Godavari Dist.
Hyderabad *	Assistant Director, Soil Testing Laboratory, Hyderabad	Tirupati	Assistant Director, Soil Testing Laboratory, Tirupati, Chittoor Dist.
Jadcherla	Assistant Director, Soil Testing Laboratory, Jadcherla, Mehbubnagar District	Vijayawada	M/s. Rashtriya Chemical & Fertilisers Ltd., Soil Testing Laboratory, 29-28-26, Kovalamudivari, Seetharampuram, Vijayawada-520 002
Kakinada	The Dy. Manager (Laboratory), M/s. Nagaruna Fertilisers and Chemicals Ltd., Nagarjuna Road, Kakinada-533 003	Visakhapatnam	M/s. Coromandel Fertilisers Limited, P.B. No. 125, Visakhapatnam-530 001
Karimnagar	Assistant Director, Soil Testing Laboratory, Karimnagar	...do...	Assistant Director, Mobile Soil testing Laboratory, Visakhapatnam
Khammam	Assistant Director, Soil Testing Laboratory, Khammam	Vizianagaram	Assistant Director, Soil Testing Laboratory, Vizianagaram
Miryalaguda	Assistant Director, Soil Testing Laboratory, NSP left canal, Miryalaguda, Nalgonda District	Warangal	Assistant Director, Soil Testing Laboratory, Warangal



<i>Location</i>	<i>Address of the Soil Testing Laboratory</i>	<i>Location</i>	<i>Address of the Soil Testing Laboratory</i>
Yammigannur	Assistant Director, Soil Testing Laboratory, Yammigannur, Krishna Dist	Nanjangud	Agril. Officer, Soil Health, SH Centre, Nanjangud-571 301
<b>KARNATAKA</b>		Shimoga	Agril. Officer, Soil Health, SH Centre, Shimoga-577 202
Bangalore (Urban & Rural)	Agricultural Officer (Soil testing) Soil Health Centre, Bangalore-560 001	Tumkur	Agril. Officer, Soil health, SH Centre, Tumkur-572 101
...do...	M/s. Zuari Agro Chemicals Ltd., Agri. Development Laboratory, 342, Sampige Road (1st Floor), 11th Cross, Malleswaram, Bangalore-560 003	Donigal	India Cardamom Research Instt. Regional Station, Spices Board, Govt. of India, Donigal Post, Sakleshpur-573 137
...do...	M/s. Rallis India Ltd., Agro-Chemicals Research Station, Plot No. 21-22, Phase-II, Peenya Industrial Area, Bangalore-560 005	Sirsi	Agril. Officer, Soil Health, SH Centre, Sirsi-581 402
Bellary	Agril. Officer (Soil Health), SH Centre, Bellary-583 101	Kotanur	Agril. Officer, Soil Health, Mobile Soil Health Centre, Kotanur, Gulbarga Dist.
Bhalki	Agril. Officer (Soil Health), SH Centre, Bhalki-585 328, Bidar Distreict	<b>KERALA</b>	
Chikmagalur	Agril. Officer (Soil Health), SH Centre, Chikmagalur-577 101	Alappuzha	Soil Testing Laboratory, Kalarcode, Alaphuzha
Davangere	Agril. Officer (Soil Health), SH Centre, Davangere-577 003 Chitradurga District	...do...(Mobile)	Soil Testing Lab, Santhanapuram, Alaphuzha
Dadesugur	Agril. Officer (Soil Health), SH Centre, Dadesugur-584 167, Raichur District	Ernakulam	Soil Testing Laboratory, Vyttila, Ernakulam
Dharwar (Mobile)	Agril. Officer (Soil Health), Central Mobile Unit, R.D.T.C. Compound, Dharwar-580 008	Idukki	Soil Testing Llaboratory, Thodupuzha, Idukki
Gadag	Agril. Officer (Soil Health), SH Centre, Gadag-562 101, Dharwar Dist.	Kannoor *	Soil Testing Laboratory, Kannoor
Gokak	Agril. Officer, Soil Health, SH Centre, Gokak-591 307	Kollam*	Soil Testing Laboratory, Kollam
Gulbarga	Agril. Officer, Soil Health, SH Centre, Gulbarga-585 103	Kottayam*	Soil Testing Laboratory, Ettumanoor, Kottayam
Hassan	Agril. Officer, Soil Health, SH Centre, Hassan-573 201	... do ...*	The Rubber Research Institute of India, Rubber Board, P.O. Kottayam-686 009
...do...*	Soil Testing Laboratory, M/s. Rashtriya Chemicals & Fertilisers Ltd., BM Road, Hassan-573 201	Kozhikode	The Rubber Board Regional Laboratory, East Nadakkavu, Kozhikode-11
Jamkhandi	Agril. Officer, Soil health, SH Centre, Jamkhandi-587 302	... do ...*	Soil Testing Laboratory, Thikkodi, Kozhikode
Kolar	Agril. Officer, Soil helath, SH Centre, Kolar-563 101	... do ...	Soil & Plant Analysis Laboratory, IISR, Calicut, Kozhikode-12
Kudigi	Agril. Officer, Soil Helath, SH Centre, Kudigi-571 232, Kodagu District	Malappuram*	Soil Testing Laboratory, Malappuram
Mandya	Agril. Officer, Soil Health, SH Centre, Mandya-571 401	Palakkad *	Soil Testing Laboratory, Pattambi, Palakkad
Mangalore	Agril. Officer, Soil Health, SH Centre, Mangalore-575 001	Palai	The Rubber Board Regional Laboratory, Regional Office, Palai
...do...	The Rubber Board Regional Laboratory, Rubber Board, IInd Floor, Kumudavathy Bldgs, Balmatta, Mangalore-1	Punalur	The Rubber Board Regional Laboratory, Punalur, Kollam Dist.
Mysore	Director, Central Sericultural Research & Training Institute, Manandavadi Road, Srirampura, Mysore-570 008	Taliparamba	The Rubber Board Regional Laboratory, Regional Office, Taliparamba
		Thiruvananthapuram *	Soil Testing Laboratory, Parothukona Nalanchira, P.O. Thiruvananthapuram
		Trisoor	The Rubber Board Regional Laboratory, Regional Office, Trisoor
		...do...*	Soil Testing Laboratory, Chembukkava, Trisoor
		Muvathupuzha	The Rubber Board Regional Laboratory, Regional Office, P.O. Junction, Muvathupuzha
		Myladumpara	The Indian Cardamom Research Institue, (Main Res. Station), Spices Board, Kailasanadu P.O. Myladumpara, Idukki-485 553



Udyogamandal*	Soil Testing Laboratory, FACT Limited, Udyogamandal-683 501	Madurai *	Asst. Soil Chemist, Soil Testing Laboratory, Pasumalai, Madurai-625 004
Wayanad	Soil Testing Laboratory, Manantavady, Wayanad	Dharmapuri *	Asst. Soil Chemist, Soil Testing Laboratory, Taluk Compound, Dharmapuri-636 701
<b>PONDICHERRY</b>			
Pondicherry	Dy. Director of Agril. (Chem), STL, Ayyankuttipalayam, KVK Campus, Pondicherry-605 010	Tiruchirapalli	FACT Soil Testing Laboratory, Ariyamangalam Industrial Colony P.O. Tiruchirapalli-620 010
		...do... *	Asst. Soil Chemist, STL, Kanjamalai, Tiruchirapalli-620 010
Karaikkal	Dy. Director of Agril. (Chem), STL, Thalatheru, Karaikkal-609 602	Madras	SPIC Agri Input Diagnostic Centre, 18, Venkatesan Street, East Tambaram, Madras-600 059
<b>TAMIL NADU</b>			
Aduthurai *	Agril. Chemist, Soil Testing Laboratory (Soil Science & Fertls), Aduthurai- 612 101, Thanjavur Dist.	...do...	M/s. Krishak Bharati Coop. Ltd., 26/6 (3rd Floor), Coats Road, T.Nagar, Madras-600 017
		...do...	M/s. Madras Fertilisers Ltd., Manali, Madras-600 068
Aruppukottai (Mobile)	Assistant Soil Chemist, Soil Testing Laboratory, Aruppukottai	Melalathur*	Asst. Soil Chemist, STL, Melalathur-635 806, Ambedkar Dist.
Coimbatore*	Assistant Soil Chemist, Soil Testing Laboratory, Laboratory Complex P.O. Coimbatore-641 013	Nagercoil*	Asst. Soil Chemist, STL, 113-A, Trowers Street, Nagercoil-629 001, Kanyakumari Dist.
		...do...	The Rubber Board Regional Laboratory, M.S. Road, Vettornimadam P.O. Nagercoil-629 005, Kanyakumari Dist.
Cuddalore*	Assistant Soil Chemist, Soil Testing Laboratory, Cuddalur-607 001	Paramakudi *	Asst. Soil Chemist, STL, Madurai Road, Paramakudi-623 707
Kancheepuram*	Asst. Soil Chemist, Soil Testing Laboratory, Panjupet, Kancheepuram-631 502, Chengai MGR Dist	Salem *	Asst. Soil Chemist, STL, Taluk Office Compound, Salem-636 001
Kovilpatti*	Asst. Soil Chemist, Soil Testing Laboratory, Kovilpatti-627 701	Erode*	Asst. Soil Chemist, STL, 14, Poonkunram Street, Erode-623 003, Periyar Dist.
Kudumiyinalai*	Asst. Soil Chemist, Soil Testing Laboratory, Kudumiyinalai, Vayalagam P.O. 622 102, Pudukkottai Dist.	Tuticorin	The Southern Petrochemical Industries Corp Ltd., SPIC Nagar, Tuticorin-628 005

\* Also have mobile soil testing units

For more details and assistance, farmers may contact the extension officials of Sericulture/Agriculture/Horticulture departments of their area.

The author is with the Central Silk Board, Bangalore.

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# Mulberry Plantation Techniques

Satish Verma, Mathew John, S.A. Aqueel and R.K. Datta

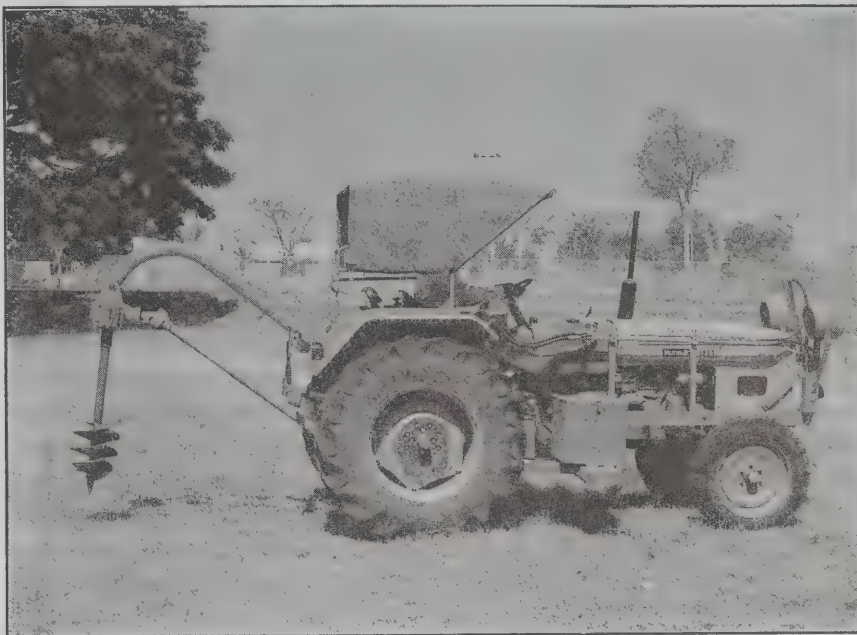
**M**ulberry (*Morus Sp.*) leaves form the sole food material for silkworms (*Bombyx mori* L.). For plantation of mulberry crop, saplings are planted in the pits or trenches made manually. Over

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**Formation of pits and trenches accounts for lion's share of the establishment cost of a new mulberry garden especially when they are carried out manually and the plantation is of large scale. CSR&TI, Mysore has evolved innovative techniques in this front in its efforts to make sericulture economically more viable.**

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three fourth of the cost of establishment of a new mulberry garden accounts for making pits or trenches. The manual trench or pit making is feasible for small scale plantation. For large scale plantation, it is economical to use material and equipments for making pits or trenches in view of



*Fig.1 Tractor operated post hole auger digger*



*Fig.2 Power tiller operated post hole auger digger*





**Fig. 3 Tractor operated subsoiler**

soaring labour/wages. The Central Sericultural Research and Training Institute, Mysore has developed innovative methods for quick plantation of mulberry saplings. This involves utilisation of tractor and power tiller operated equipments for making pits and trenches.

### **Pit making equipments**

The equipments for making pits are called post hole diggers or auger diggers. In India, tractor and power tiller operated auger diggers are available.

### **Tractor operated auger digger**

Fig. 1 shows a tractor operated auger digger. It could be mounted to the tractor 3-point linkage. It consists of a spiral auger driven through bevel gears by the tractor power take off (P.T.O) through an universal drive shaft provided with a unit shear bolt torque limiter. The auger operates at a speed of 120–130 rpm. A minimum 30 hp tractor is required for the operation of an auger digger. The auger points are replaceable. The augers of various diameters such as 22.5 cm (9"),

30 cm (12") and 45 cm (18") are available. The auger digger can make pit upto a depth of 90 cm (3 feet).

The tractor operated auger digger was tested for making pits in different types of soils. It has been observed that auger digger makes basin like structure for efficient water harvesting and conserving rain water. The number of

pits made per hour depends upon the soil type and its condition. The table shows performance of auger digger and problems faced in different soils. Saplings were planted in pits made by auger digger. A saucer basin is formed around the plant immediately. The saucer type structure collects the rainfall water. The *in situ* water harvesting and moisture conservation helped in quick establishment of plants. The loose soil encouraged root growth.

The cost of tractor operated auger digger is about Rs. 30,000 and the cost of operation is about Rs. 200/ha. Although cost is initially high, the equipment has been found cost effective and fast in making pits. It could also be utilised for making pits for plantation of any horticultural crops, forest plants, installation of fencing poles and marking stones etc.

### **Power tiller operated auger digger**

Fig. 2 shows a tiller operated auger digger. The digger is a

**Table. Performance of Tractor Operated Post Hole Digger in Different Field Conditions**

(Tractor capacity : 50 HP, Extra weight added for easy penetration : 100 kg, Diameter of pit : 12")

Field condition	No. of pits dug per hour	Depth of pit (")	Remarks
Uncultivated paddy field sticky soil	40–45	18	Frequent cleaning of implement required
Ploughed field clay content more	55–60	18	- do -
Uncultivated land-top removed clay content more	35–40	18	- do -
Ploughed field, smooth soil, small stone particles more	70–75	18	Ideal for making pits
Ploughed field-stoney field	10–15	18	Laterate type of stoney formation at a depth of 6-9", fallow land for over one year
Uncultivated grass land	5–10	18	Upto 9" the digging is very slow after that very fast due to loose and moist soil



## **Manufacturers/ Suppliers of Auger Diggers and Subsoiler**

### **Tractor Operated Auger Diggers & subsoilers**

**Farm Implements (India)  
Pvt. Ltd.,**  
No. 10, Kumarappa Street,  
Nungambakkam,  
Chennai - 600 034

**Tractors and  
Farm Equipment Ltd.,**  
(TAFE), 35,  
Nungambakkam High Road,  
Chennai - 34

**JNP Agro Systems  
Pvt. Ltd.,**  
15, Poes Road,  
3rd Street, Teynampet,  
Chennai - 18

### **Power Tiller operated Auger Diggers**

**Marudhamalai Andavan  
Industries,**  
Gokulam Colony,  
P.N. Pudur,  
Coimbatore - 641 041

**Swathi Industries,**  
Marudhamalai Road,  
P.N. Pudur,  
Coimbatore - 41

**Surya Engineering Industries,**  
412, Vivekananda Road,  
Ramnager,  
Coimbatore - 9

**King Industries**  
Near Ponnuraman Kovil,  
Irugur,  
Coimbatore - 3

**Kovai Engineering Works,**  
39, Dhanalakshmi Puram,  
Singanallur P.O.,  
Coimbatore - 5

**Joeraj Industries,**  
5, Opp. Head Post Office,  
Coimbatore - 1

**Beracah Engineers,**  
436, Marudhamalai Road,  
P.N. Pudur,  
Coimbatore - 41



**Fig. 4 Trenches opened by a subsoiler**

standard unit which can be mounted in the front of a power tiller. The digger consists of a spiral auger actuated by a rack and pinion arrangement. With this arrangement, auger could be moved up and down with the help of a simple hand wheel. The energy for the circular motion of the auger is effected through a transmission system comprising of

a belt, pulleys and bevel gear set. The entire assembly is mounted on a rectangular frame with necessary bearings. The hand wheel can be used for depth control. The equipment is provided with augers of different diameters such as 22.5 cm (9") and 30 cm (12"), etc. The speed of auger is about 425 rpm. The cost of power tiller operated auger digger is about Rs. 8000. It



**Fig. 5 Mulberry saplings planted in trenches opened by a subsoiler**

can dig about 30 to 35 pits/hour. Like tractor operated auger digger, power tiller could also be utilised for similar purposes.

### Trenche making equipments

Pit method of plantation of mulberry is generally practised in rainfed areas. Under irrigated conditions, mulberry could be planted in trenches made with the help of a tractor operated subsoiler (Fig. 3). Subsoiler is basically an equipment for breaking hard pan and deep soil cultivation. It consists of a long and narrow standard with a heavy wedge shaped point. Cost of a subsoiler is about Rs. 9000 and a tractor of 30–35 hp is required to operate it. The depth of trench made by subsoiler is about 60–70 cm and a width of 50 cm in width. The soil in the trench is fully loosened and well-aerated. It also increases the water holding capacity of soil. Fig. 4 shows trenches opened by subsoiler for plantation of mulberry. A subsoiler saves tremendous amount of manpower required to make pits. A high percentage of plant survival and good growth has been observed in mulberry garden using subsoiler trenches (Fig. 5).

*The authors are with CSR&TI, Mysore.*

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# Economics of Sericulture : An Update

S. Lakshmanan, R. Jayaram, R. Ganapathy Rao, B. Mallikarjuna  
and R.G. Geetha Devi

**S**ericulture is considered as an income generating avocation in the rural areas. It suits well for marginal and small scale farmings in view of its low investment profile and family employment opportunities. Although, it is being practised all over the country, about

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***Sericulture has all along remained a remunerative crop, especially for the rural populace of the country, as it not only fetches periodical income but also ensures employment for the family labour. Yet, considering the increase in the cost of several inputs over the period, a re-look at the economics was perhaps essential. The present sample study is an attempt in that direction.***

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95% of total silk production is from four states of Karnataka, Andhra Pradesh, Tamil Nadu and West Bengal.

The periodical income from sericulture is one of the chief rea-

sons for its survival. However, many a time, it is observed that cost of production overrun the benefit, from cocoon production. In today's environment, sericulture has to compete with several cash crops. Therefore, a study on economics of sericulture is highly essential not only to estimate the cost return ratio from a unit area, but also to convince at the grass root level about its remunerativeness as compared to other crops.

The present study is attempted with an objective of estimating cost and income at different states and across different regions in southern states. A methodology was followed based on "Cost of Cultivation of Principal Crops (CCPC)" conducted by Ministry of Agriculture, Government of India for cost accounting system in the study regions.

A sample survey was conducted in four southern states of Karnataka, Andhra Pradesh, Tamil Nadu and Kerala during 1993-94 and 1995-96. A sample of 750 households was drawn at random following Multistage Stratified Random Sampling Design. The data were collected by personal contact method at a three month interval of selected farmers during the above period.

## Major Findings

The findings emerged from the sample survey is presented in the table.

## Mulberry Leaf Production

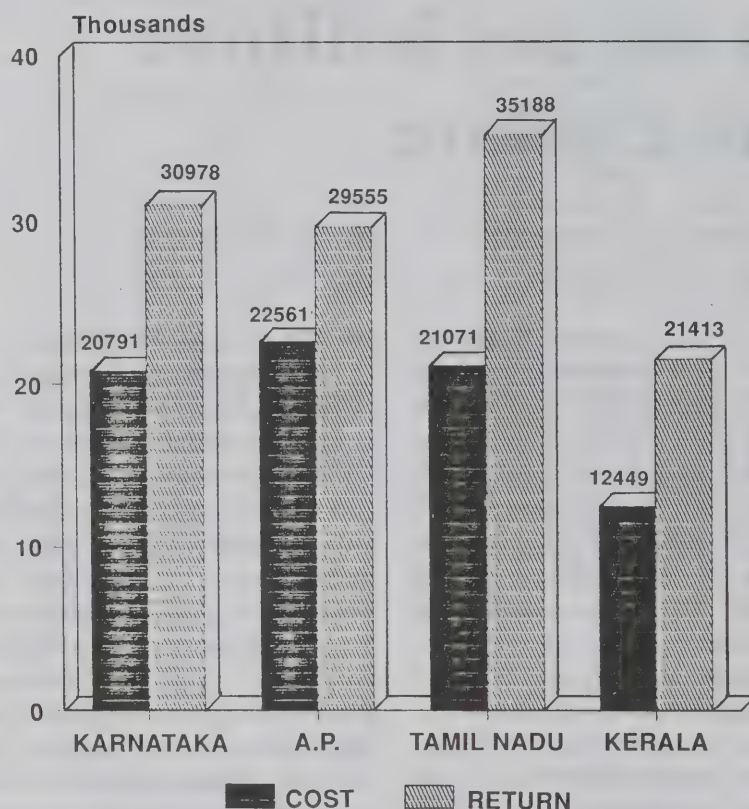
The maximum average leaf yield/acre/year produced by sample farmers in Tamil Nadu was 8565.500 and 8775.740 kg during 1993-94 and 1995-96 while in Kerala for the same period, it was 5550.000 and 5460.180 kg, respectively. In the case of Karnataka and Andhra Pradesh, it was 7471.000 and 8101.000 kg for 1993-94 and 8309.200 and 7777.480 kg for 1995-96. The low yield in Kerala was mainly attributed to unorganized farming, partial irrigation and poor maintenance of the garden.

## Cost of Leaf Production

The estimated total cost of mulberry leaf production from Karnataka indicates that farmers had incurred an average of Rs. 9580.40 and Rs. 11003.45 during 1993-94 and 1995-96 under assured irrigated farms as against Rs. 4704.15 and Rs. 5304.35 under rainfed forms during the above period. In Andhra Pradesh, it was worked out to be Rs. 9672.00 and Rs. 10574.93 while in Tamil Nadu and Kerala it was Rs. 10336.40 and Rs. 9854.95; Rs. 9517.55 and Rs. 6144.20, respectively. The cost difference between years and states was due to increasing resource price and irrational use of factors of production in the farms.

The estimated per kg leaf cost

## COST AND RETURN FROM SERICULTURE (1995-96)



was high in Kerala as compared to other states under reference period. It was because of high resource cost followed by low quan-

tity of leaf production. In Karnataka, rainfed farms had incurred less cost than irrigated farms. The other two states, Tamil

Nadu and Andhra Pradesh incurred Rs. 1.19 and Rs. 1.21; Rs. 1.36 and Rs. 1.12 for 1993-94 and 1995-96, respectively.

### Cost of Cocoon Production

The sample survey reveals that farmers in Karnataka had incurred an average of Rs. 65.66 and Rs. 79.60 in producing one kg of cocoon under irrigated condition under the reference period while it was Rs. 69.34 and Rs. 74.89 in rainfed farms. The cocoon production cost per kg in Tamil Nadu, Andhra Pradesh and Kerala was Rs. 65.06 and Rs. 74.45 and Rs. 70.80 for the year 1993-94 and Rs. 69.97, Rs. 88.19 and Rs. 82.37 for the year 1995-96.

### Cocoon Yield

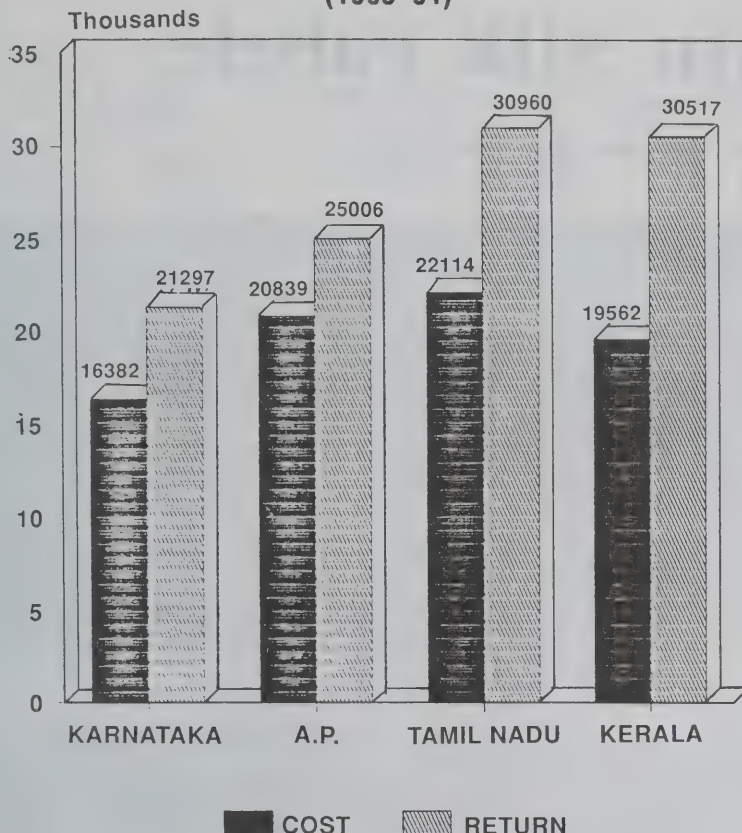
In Tamil Nadu, farmers had produced higher quantity (339.900 kg/acre for 1993-94 and 301.140 kg/acre for 1995-96) as compared to Karnataka (249.500 and 261.190 kg), Andhra Pradesh (279.900 and 255.820 kg) and Kerala (248.250 and 151.140 kg). The reasons for poor yield

**Table - Cost and returns from sericulture in 1993-94 and 1995-96 (Unit : per acre/year)**

Particulars	Karnataka (irr)		Karnataka (rainfed)		Andhra Pradesh		Tamil Nadu		Kerala	
	1993-94 (n=292)	1995-96	1993-94 (n=108)	1995-96	1993-94 (n=200)	1995-96	1993-94 (n=100)	1995-96	1993-94 (n=50)	1995-96
Avg. leaf Production	7471.00	8309.20	4243.00	4711.00	8101.00	7777.40	8565.50	8775.74	5550.00	5460.10
Avg. cost of leaf production	9580.40	11003.45	4704.15	5304.35	9672.00	10574.93	10336.40	9854.95	9517.55	6144.20
Avg. cost/kg. leaf	1.28	1.36	1.11	1.13	1.19	1.36	1.21	1.12	1.71	1.12
Avg. cocoon yield (kg)	249.50	261.19	106.20	131.19	279.90	255.82	339.90	301.14	248.25	151.14
Avg. cocoon production cost	65.66	17.60	69.34	74.89	74.45	88.19	65.06	69.97	78.80	81.94
Avg. rate/kg of cocoon	79.18	115.35	62.50	92.95	76.87	105.81	81.12	105.53	105.43	133.63
Total cost	16382.20	20790.70	7363.90	9824.80	20838.50	22560.80	22113.90	21070.80	19562.10	12449.40
Gross returns	21296.90	30978.15	8026.65	12772.25	25006.20	29554.60	30959.50	35188.25	30516.90	21413.00
Nel returns	4914.70	10187.45	662.75	2947.45	4167.70	6993.80	8845.60	14117.45	10954.80	8962.30
Cost-Benefit ratio	1:1.30	1:1.49	1:1.09	1:1.30	1:1.20	1:1.31	1:1.40	1:1.67	1:1.56	1:1.72



## COST AND RETURN FROM SERICULTURE (1993-94)



performance of Kerala was due to brushing of less quantity of dfls and low leaf yield than other states.

### Returns

The return profile both gross and net from one acre of mulberry garden reveals that farmers from Tamil Nadu and Kerala registered better returns than Karnataka and Andhra Pradesh. The reason for higher profit was partially higher yield obtained by Tamil Nadu farmers while farmers from Kerala

realised higher profit merely due to higher cocoon price as most of the sample farmers were bivoltine seed farmers. The estimated net-profit in Tamil Nadu, Kerala, Andhra Pradesh and Karnataka were Rs. 8845.60 and Rs.14117.45; Rs. 10954.80 and Rs. 8963.60; Rs. 4167.70 and Rs. 6993.80; and Rs. 4914.70 and Rs. 10187.45 for 1993-94 and 1995-96 respectively.

The benefit-cost ratio indicates that farmers of Kerala were ben-

efited much more than other states. However, during 1995-96 all the states realised higher side of benefit-cost ratio than 1993-94. It was due to the increase in cocoon price.

### Implication of the study

The study draws the following implications for perspective development of sericulture in the long-run in the study regions.

- The economics of sericulture widely differs across the states and regions. It is mainly due to the level of sericulture practices which is varying according to the existence of different socio-economic conditions at farmers' level.
- The cost of production was reported to be increasing over the period and crop loss due to various diseases were not minimised considerably. These factors prevented from reaping maximum benefits.
- The benefit-cost factor is totally governed by cocoon price. In the absence of a price policy, the benefit widely fluctuates.
- In order to overcome immediate loss from sericulture, farmers are to be educated in the utilisation of resources on rational basis to reduce cost of production in the short-run and suitable price mechanism to be evolved to safeguard sericulture industry in the long-run.

**The authors are with CSR&TI, Mysore.**

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# Defects in Silk Fabric

Nivedita Rao and G.S. Nadiger

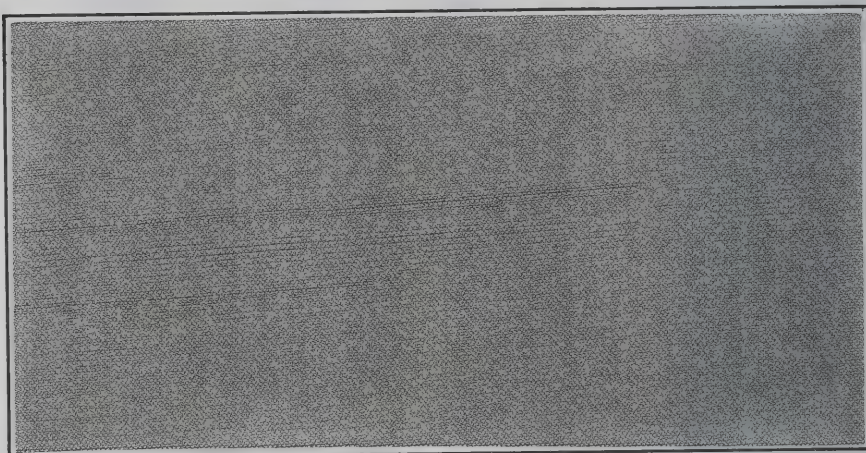
**F**abric defects or faults are the local deviations from the desired fabric quality/appearance or the disturbances in the fabric structure which may lead to locally limited changes in the fabric properties. They affect the aesthetic and comfort properties, besides the

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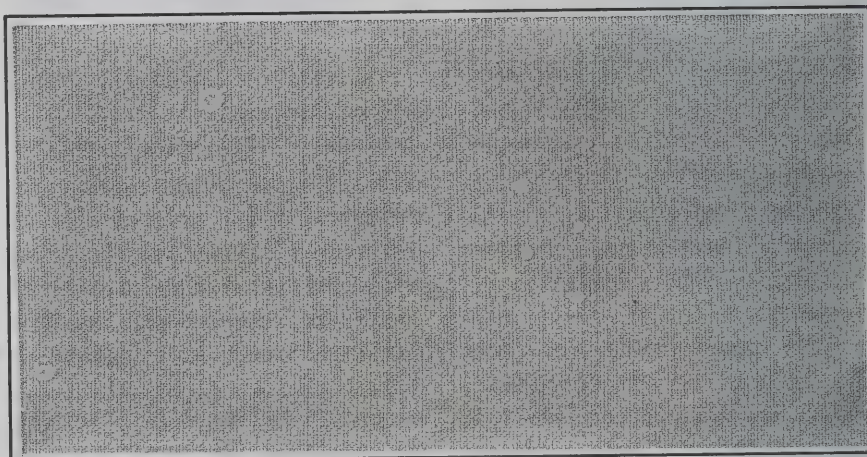
***A defect in the fabric, especially in silk, however small or negligible it may be, affects not only the quality but also the value of the product. It also affects the aesthetic and durability properties of the fabric. A little extra care for the minor details at various stages of manufacture will avoid such defects and ensure production of quality product. The authors attempt to enlist such defects and also to offer possible remedies to prevent them.***

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durability and functional requirements of the fabric. These faults may be sporadic or occur at regular intervals throughout the fabric or affect even the entire lot.



**Fig 1. Weft streaks**



**Fig 2. Weft loops**

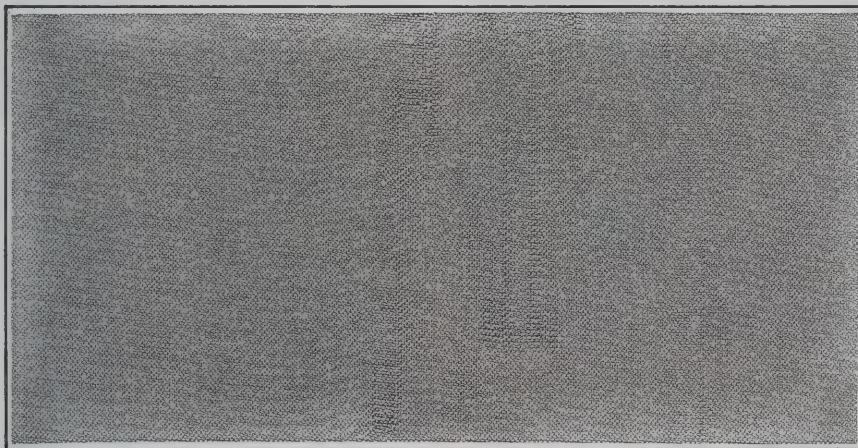
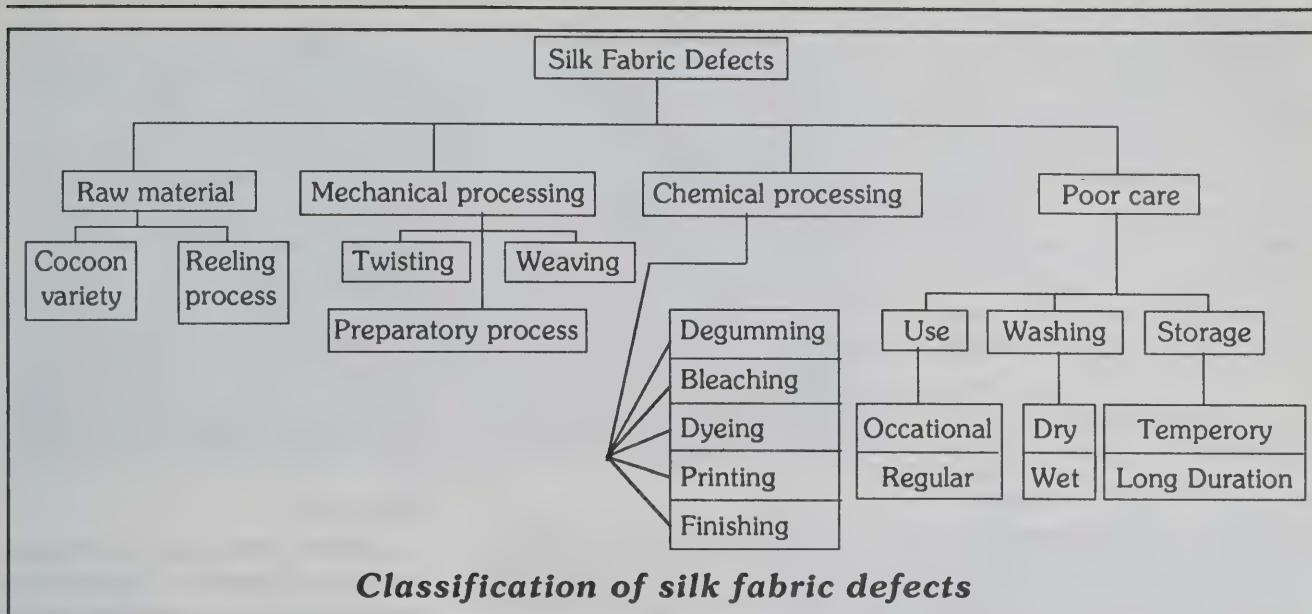
The causes of fabric defects can be extremely varied arising from raw materials as well as all the preliminary processes from yarn production through weaving preparations to the weaving process, finishing and the care exercised during use and thereafter.

An attempt is made to classify the fabric defects based on their sources and also to discuss the causes and possible remedies in the following paragraphs.

## **Raw Material Defects (fibres/yarn)**

Defects in the raw silk such as long knots, slugs, nips, oil/fungus/ mould stains, hairiness, thick and thin places etc. can show up on the fabric as faults, especially in light weight fabrics like tabby, habutae and organdy. They also create problems of cut ends, broken picks, tight threads and floats. Denier variations and variations in visual characteristics of raw silk i.e., colours, lustre and hand result





**Fig 3. Warp bars**

in barre fabric and uneven dyeing. Shimmers and lousiness are frequently occurring defects in silk fabric due to poor cohesion in raw silk. The mechanical abrasion makes the filaments to open up and flatten the yarn resulting in shimmers. In skein dyeing, this yarn has a tendency to split up and the cut fibrils cause tiny nips, knots and specks to form on the yarn and woven fabric. Poor neatness characteristic of raw silk can also cause this defect.

### **Mechanical Processing Faults**

#### **Winding and Twisting :**

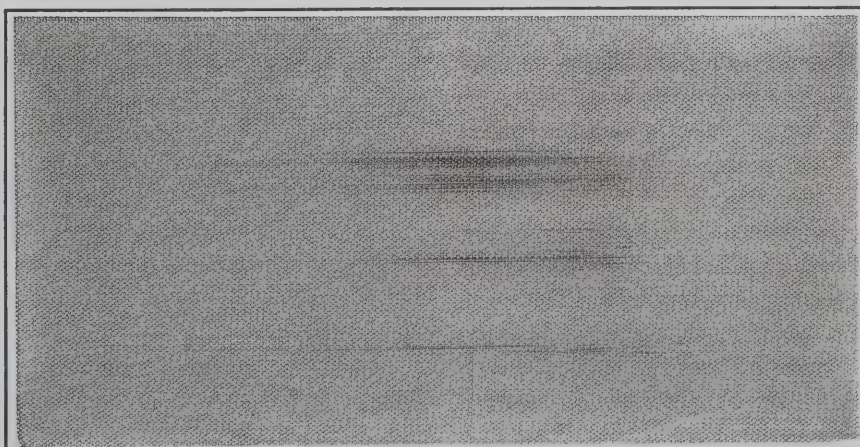
- Too tightly or too slackly wound bobbins, convex bobbins, bobbins with double ends

and with partly dried silk or with long tail ends of knots create problems in subsequent processes.

- Shade variation after dyeing

can be the result of improper oil soaking.

- During doubling, variations in tension of individual yarns being doubled can result in corkscrews, loops and broken ends in the cloth.
- Variations in the twist level means light is reflected differently by the yarns causing the effect of steakness (Fig. 1). Also fine cracks due to highly twisted yarn, shimmers, weft bars, pluckered and different surface effects in crepe, chiffon and georgette varieties can result due to twist variations. Shade variations in the fabric can be the result of mixing up of twisted yarns during the



**Fig 4. Oil stained warp**

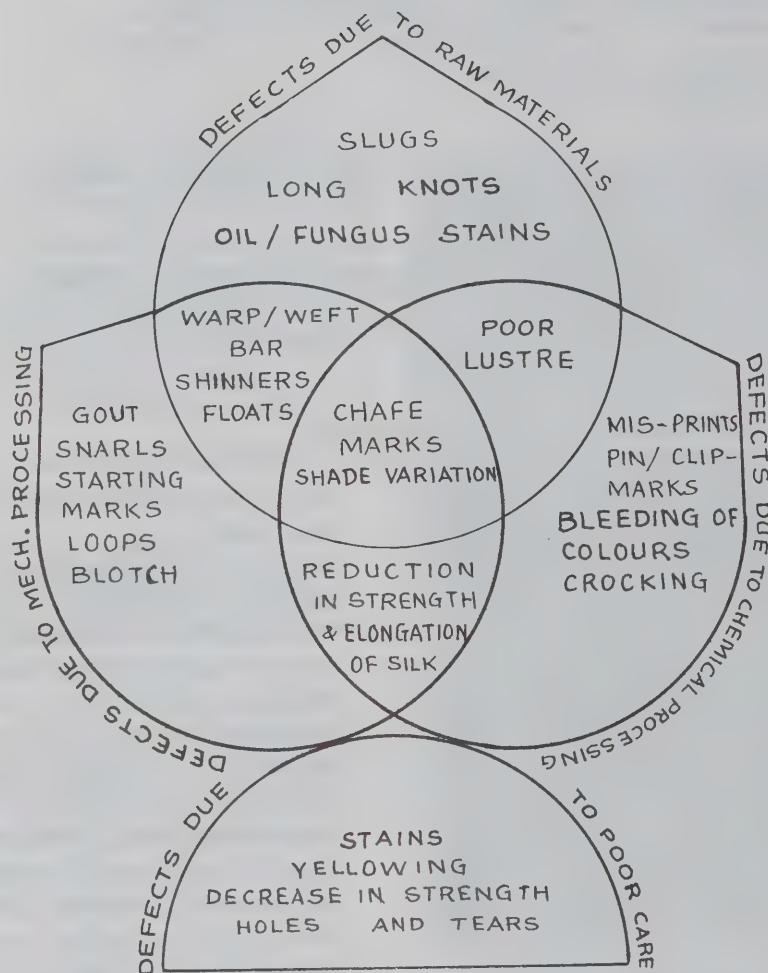


of different lots also gives rise to weft bars. Too much tension during preparatory processes can stretch the silk yarn to such an extent that a permanent extension is set in the yarn and its natural tensile properties are altered. Imperfections in the cloth like fluff and dirt entanglements, dust and oil stains (Figs 4 and 7) can enter the fabric if proper material handling and house keeping practices are not followed at this stage.

### Weaving

These faults can be grouped under two heads – (1) due to mechanical cause and (2) negligence or poor skill of weaver.

**Mechanical causes :** Reediness and wrap streaks (Fig 5) in silk fabric are frequently caused by non-uniform spacing of dents in inferior quality reeds or worn out reeds. Excessive warp tension, late shedding and beat up taking place before sheds are properly closed which prevent proper dispersal of warp threads cause reediness in the fabric. Floats are produced when the warp and weft yarns do not interlace properly. This happens when adjoining ends get entangled in the region between healds and fell of the cloth. Starting marks are of two kinds one with less pick density than normal, the other with crowded picks. Let-off



### Defects and their influence on silk fabric

doubling/weaving processes. Improper heat setting of twist induces defects associated with lively yarns such as snarls, loops, cut ends, entangled ends etc. (Fig 2)

**Preparatory Process :** Warp way streaks (Fig 3) in the fabric are often attributed to variation in tension during wrap preparation and wrong warping. Similarly, weft bars can be ascribed to spindle-to-spindle tension variations during pirn winding. Mixing of pirns

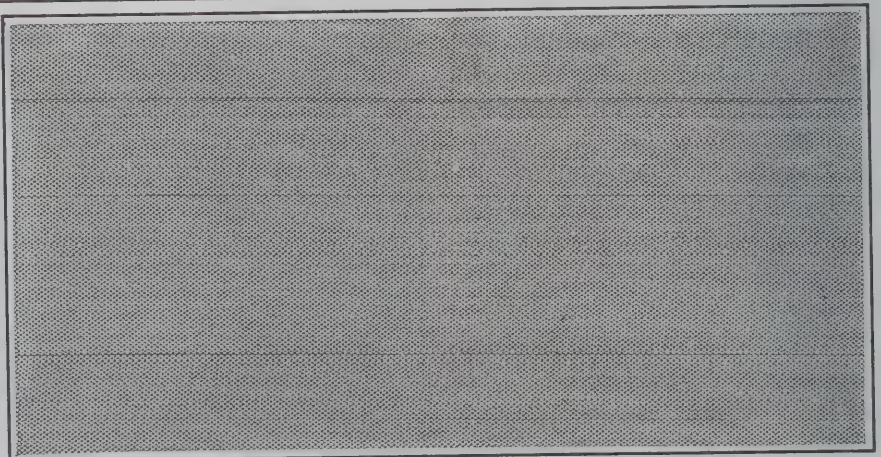
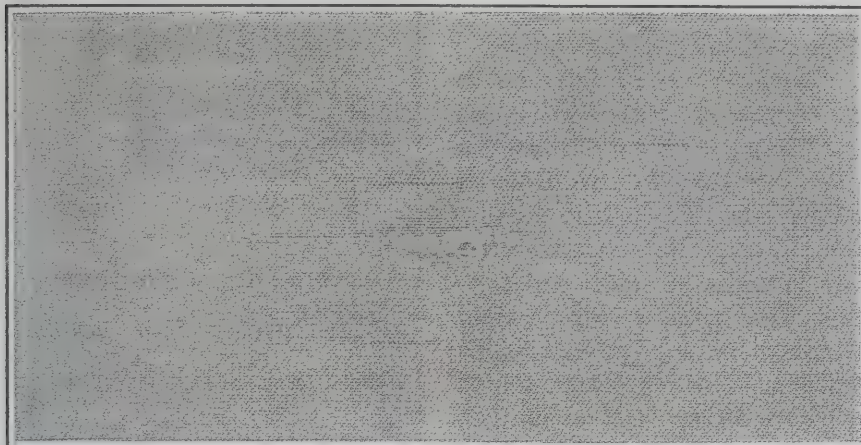


Fig 5. Warp streaks





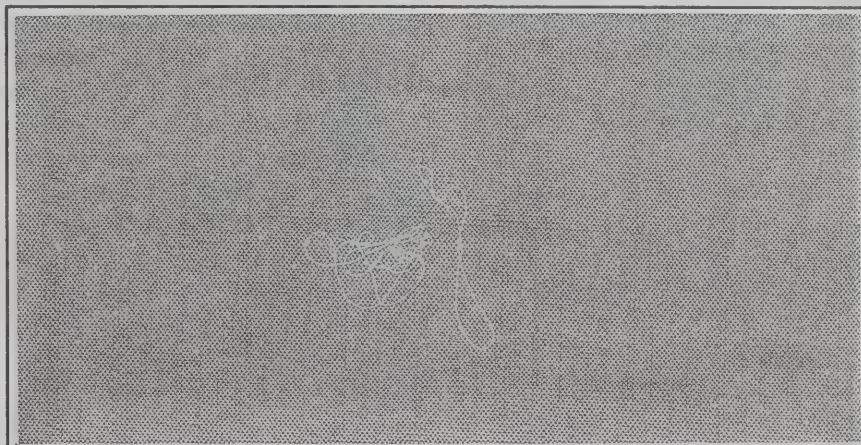
**Fig 6. Gout**

and take-up motions should be maintained properly. Chipped pirns, eccentric pirns, high unwinding tension, rough shuttle or shuttle box etc. can cause ply breakages in weft yarn, tight picks or broken threads.

**Negligence/poor skill :** Streakness can be attributed to a large extent to wrong selection of reed number and type and wrong denting in the reed and healds. Defects are introduced when broken ends are not detected and mended promptly by the weaver using weaver's knot. Broken picks are to be removed and a new pick has to be inserted from the beginning of the shed. Picking twice in a shed and missing picks are other defects due to weaver's carelessness/poor skill. 'Gout' (Fig 6) is foreign matter getting woven into the fabric such as loom fly, human hair, fluffy waste, small wood chips etc. A 'Blotch' is a mark caused by loom oil or grease falling on the cloth. Soiling the fabric due to unclean hands or rusty metal parts is another objectionable fault accredited to the weaver.

### **Wet processing**

**Degumming :** Chafe marks often at creases, lime soap residues due to use of hard water and poor rinsing of goods, metal spots are some of the defects introduced



**Fig 7. Entangled warp**

during degumming. Concentrated alkali damage is the most frequently observed chemical damage to silk, resulting in the formation of dull light or white spots on dyed fabric. This is because silk filaments split up into fibrils which get cut and scatter incident light differently. Uneven degumming can cause sericin retention on the fibres leading to deeper shades in these parts after dyeing or uneven dyeing. Loss of strength due to manual hydroextraction leading to poor functional quality of silk is a common invisible defect.

**Bleaching :** Yellowing on exposure to light with inadequate bleaching, or on steaming, damage to the goods due to excessively strong oxidative treatment and small holes (metal spots) are some of the effects of improper

bleaching methods. Wet, degummed silk is particularly susceptible to mechanical damage during bleaching and dyeing.

**Dyeing :** Unlevelness in the dyeing can be due to unsuitable dyeing conditions. Colour bleeding, staining and poor rubbing fastness are caused due to :

- incomplete exhaustion of dye bath ;
- dye not fixed properly and
- washing not done thoroughly.

Rubbing of the fabric surface

against itself or rough places in the machine can cause chafe marks which look like as though the material has been sprinkled with a white powder or flour. Chafing may be aggravated during finishing process if the temperature, duration of treatment and pH values are too high. Overall degradation of the fabric can occur due to mechanical, chemical or thermal treatments or their combinations resulting in reduction in strength and elongation of the silk.

**Printing :** Misprints, misregister, crease lines, doctor's line, printing stains, unlevelness of blotch prints etc. are some of the faults due to the printing process.

During steaming, halos in discharge printing, flushing (blurred edges) shallow prints, irregular



fixation and water drops/spots are introduced. In washing off, bleeding of printed colours into the ground, lightening of printed colour, crocking, etc. can take place. Crossfeed and creasing are caused by squeezing rollers or overstrong centrifuging during hydroextraction.

**Finishing :** Pin or clip marks near the selvages are caused on the tender frames and during calendering.

Faults of the weighting treatment is that it can make the fibres hypersensitive to rubbing resulting in rough handling. It also makes the silk fabrics less stable to storage and more liable to photochemical oxidation.

If conventional methods to impart *scroop* to silk are followed, the storage is affected especially in changing weather conditions.

#### **Poor care**

**Use :** A silk fabric does not soil readily due to smoothness of the fibres. However, being hydrophilic it is susceptible to water soluble stains and oil stains. Silk is weakened by perspiration (acids) especially if it is stored without cleaning. Perspiration can also affect the colour in dyed and printed fabrics.

It is desirable to iron silk under a press cloth using low to medium temperature. At higher temperature, silk loses its weight and strength at about 175°C and the colour changes from white to yellow, brown and then black at 250°C.

Effect of light on silk is the primary cause of its degradation and the most noticeable alterations are yellowing and decrease in breaking strength. Also, exposure to sunlight can fade the colours in silk fabrics. Drapery and upholstery fabrics should be protected from exposure to sunlight. Silk loses

its lustre on abrasion and can tear, if handled roughly during use.

**Washing :** Dry cleaning is recommended for silk not because it is harmed by water but because it can shrink due to yarn structure (crepe) and its non fast colours. Some silks can be laundered safely with mild neutral soaps and non-ionic detergents in warm water without stretching and with gentle agitation. Chlorine bleach should be strictly avoided as it can weaken the fibre and force it turn yellow. Sometimes, colour bleeding and colour staining are noticed on dry cleaned fabric. This is because during dry cleaning, a little water and detergents added to remove water soluble stains or unsuitable solvent can affect the colours.

**Storage :** White silk fabric has a tendency to turn yellow with age. Weighted silk deteriorates even under good storage conditions because it breaks at folds. Fabrics should be stored after cleaning and protected from moths and carpet beetles which make holes in the fabric. While fibroin is a poor nutrient for micro organisms, the gum is an excellent food for moulds and bacteria. Hence, undegummed/partly degummed varieties should not be stored in moist and warm conditions, otherwise dark staining can develop in a short span of time.

The sphere of influence on some fabric defects in silk fabrics is represented in the diagram.

The source of such impurities should be identified and alternate products/processes adapted to ensure eco-friendliness at every stage from 'cradle to grave' i.e., from basic raw materials to weaving to wet processing, packaging, usage of cloth and its care, recycling and disposal of waste.

**The authors are with CSTRI, Bangalore and Textiles Committee, Bombay respectively.**

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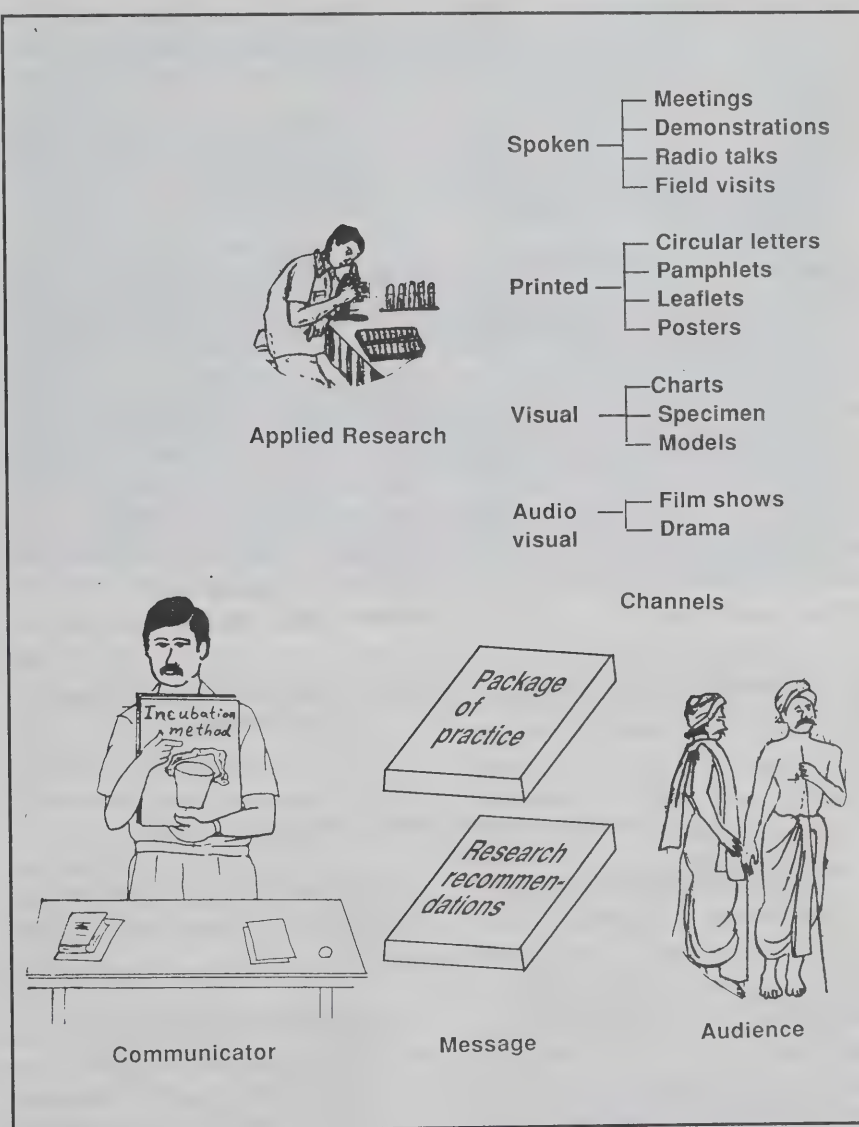
# Key Elements of Effective Communication

Shrishail S. Dolli, N.R. Singhvi and R.G. Geetha Devi

**T**echnological changes, today, have been taking place at a faster rate in all fields. Sericulture industry is one such field which has experienced speedy growth during the last decade. Over the

***Percolation of technology mainly depends on the communication skills of an extension worker even in these days of communication revolution. Various studies indicate that adoption of technology by the sericulturists is incommensurate with the technological advancement. The article delves into the modus operandi of extension communication vis-a-vis the communicator's skill in couching the message to suit the farmers conditions.***

years a robust sericulture system has been built in the country. Yet, one continues to hear complaints that most of the technologies developed are not properly disseminated in the field resulting in non-



adoption by the farmers. At the current level of needs a range of technologies are available which are not only good and practical but also would enhance production and productivity.

Various extension studies conducted in the last decade have

revealed that the main reason for non-adoption of technology by sericulturist is, lack of knowledge of new technology and realization of its benefits. These studies stressed the need for organising various extension communication programmes in an effective way.

There is a need for an effective sericultural communication system in which information is generated, transformed, transferred, consolidated, received and feed-back follows in such a manner that these processes function synergically.

Successful extension communication requires a thorough understanding of the elements. There are many methods which explain the communication process. One such method given by Leagans (1961) is presented in Fig. 1. It is most applicable to present communication net work. The model consists of six important elements.

### Communicator

Communicator is one who undertakes the process of communication i.e. an extension worker. He is the source or originator or sender of the message. Extension worker plays a vital role in the communication process as he who decides the mode and manner of the message to be disseminated.

message or impart detailed knowledge etc.

- Audience – farmers or sericulturists – their needs, interests, objectives, resources, predispositions etc.
- Message – its content, validity, usefulness and importance.
- Channels – suitable to the message, audience and situation.
- Treatment of the message—He must have professional ability of organising and treating the message.

### Message

Message implies dissemination of information useful to the farmers. In other words, it is package of practices recommended to the farmers. Messages are not precisely the same as the subject matter of the technology to be conveyed. They are rather a generalised idea of what the subject matter means. Further, all the technology may not be relevant at all times. Extension worker has to relate useful and economically

- Timely i.e., appropriate to the season and operation.
- Appropriate to the channel.

The extension workers skill in selecting the message would also influence the effectiveness of the communication. The message must interest the farmers and must be couched in local language. If the message selected is not appropriate, the farmers may fail to distinguish the key issues and thus, objective of message is defeated. For example, if farmers lack knowledge of incubating layings, the message must contain information on importance of incubation, different devices available, feasibility, costs, returns etc.

### Treatment of the message

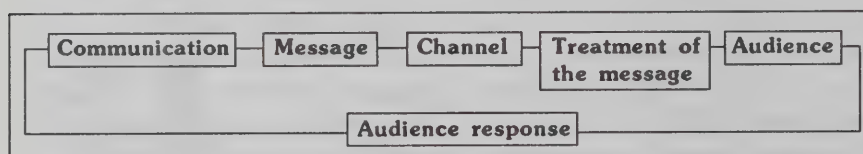
Any technological information cannot be taken as it is, to the farmer. The scientific outcome relevant to farmers field situation has to be put in proper form to make it more clear and understandable. Treatment of the message differs with the form in which it is presented, i.e., spoken, written, visual etc. It involves following aspects :

- Sequencing the message properly.
- Highlighting key points.
- Presenting in proper form i.e., conversation type, folk song, caption form etc.

### Channels

Channels are the vehicles through which message is conveyed from communicator to the receiver i.e., extension worker to farmers. They are also referred as communication methods. The choice of communication media is of vital importance particularly in our country where the percentage of literacy is low. It is, therefore, essential that extension worker

**Cotd. on Page 32**



**Fig. 1 Leagans model of communication process**

Communication ability is one of the important qualities of an extension worker. The proper transfer of technical information is influenced by the effective communication skill. The extension worker can make use of written, spoken, printed, visual and audio-visual media for getting across the idea among the farmers. For effective communication, extension worker must know:

- The objective of communication what he wants to achieve. Whether he is interested in creating awareness about the

feasible technology to the needs, interest and resources of the farmer.

### A good message must be:

- In line with the objective.
- conforming to the mental, physical and social capabilities of the farmer.
- Clear and understandable to the farmer.
- Specific and lucid.
- Accurate, up-to-date and functional.
- Appealing and attractive.
- Economically relevant.



# Muga: New Oviposition Device

A.K. Sahu and P.K. Das

**K**harika, is a traditional device used for tying the female moth of muga for egg laying. It has been observed that the process requires considerable labour right from collection of kharika to the tying of moths for oviposition. In grainages, it is difficult to accommodate large number of kharikas in the oviposition hall. Attempts made to formulate a

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***The traditional methods of oviposition practised in muga grainages are time, space and labour consuming.***

***The improvements attempted by the authors in the Kharika device is said to be space saving and economical, as well.***

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suitable device for oviposition in the last two years indicated that muga moths, if not tied, do not confine themselves to a particular place and lay eggs in a scattered manner unlike mulberry silkmoth. Moreover, there was about 15-20% reduction in the fecundity in different devices used as compared to kharika. It was, therefore, inferred that the moth prefers a vertical position and that it has to be confined while ovipositing.



*New oviposition device for muga silk moth  
Antheraea assama Wu*

## **New device**

The new device was fabricated mainly to economise the space required for oviposition. The device consists of four sheets of thermocole of 2" thickness each measuring 3' x 1.5' wherein 50 perforations (at 4" gap) were made to insert 50 small twigs in a vertical position to act as a kharika to tie the moth. The four sheets were arranged vertically in a bamboo frame. Thus, 200 moths could be accommodated in an area of 11.25 cft. as compared to 90.00 cft. required for accommodating 200 kharikas (length of kharika:1' placed at a distance of 6" from each other) in the traditional method (Figs. 1 and 2).

## **Comparative fecundity**

Trials conducted with the de-

vice revealed that the average fecundity per moth was 217 with an Oviposition Index of 0.87 as compared to 192 per moth in the control with an Oviposition Index of 0.86. There was no reduction in the Oviposition Index in the new device.

## **Advantages**

- It can accommodate large number of moths in a limited space.
- Tying of moth for oviposition has been made simple. A loop of cotton thread has been provided to the twig used as kharika to hold the moth.
- It can be kept anywhere in the grainage hall just like a rack and taken out during moth examination.
- The device can be covered



**Arrangement of twigs in thermocole sheet**

- with suitable net and placed in the varandah during summer seasons for proper aeration.
- The moths/eggs can easily be protected from predators.
- The eggs can be prevented from falling on the floor.
- Tieing of moths to the twigs in the device takes lesser time as compared to the traditional

methods. 600 moths can be tied per hour against 360 moths in traditional method (@ 6 seconds /moth in the device and 10 seconds per moth in traditional method).

- The device eliminates the requirement of special arrangements in the grainage hall for keeping moths for oviposition.
- It will prevent secondary contamination of diseases.
- If the device is fabricated with durable and non-corrosive material, it can be disinfected and repeatedly used with less cost and labour input.
- It can also be used for other non-mulberry silk moths, especially for oviposition in eri grainages.

**The authors are with RMRS, Boko, Assam.**

*Contd. from Page 30*

## **Key Elements of Effective Communication**

should choose a compatible communication system to meet the demand of quick and prompt communication of such technologies from research stations to sericulturists. The need is also felt to minimise the time-lag between the generation of new technologies and their transfer to sericulturists. There are a number of methods which are broadly classified into individual, group and mass contact based on the number of farmers or farm families involved. Few examples, F & H visit, mini kit trial method and result demonstration, field days, campaign, exhibition etc. Research studies show that combination of communication methods is very effective.

### **Audience**

In communication system, sericulturists and reelers form the audience groups who are heterogeneous with respect to their age,

### **Tips for effective communication**

- Know your audience/users of the message their knowledge, attitude, family, community, socio-economic status etc.
- Speak their language.
- Support the message with example.
- Let your action support the message delivery.
- Give economics of the practice.
- Anticipate questions and clear the doubts.
- Highlight key points.

education, farm size, knowledge, attitude and adoption behaviour.

Communication will be effective where the audience are homogenous. The information about audience literacy, socio-economic condition, crops grown, resources, traditional folk way would help the extension worker in planning a communication programme.

The communication process, is indeed a very complex one which links up two or more human beings wherein one becomes a source and the others become receivers. Even if technical and

mechanical devices are to be used in the communication process, the human element cannot be ignored. It is the human element i.e. the sericulture extension worker who designs the message, develops or selects the channel for transfer of message, manipulates the channel and transfers the message to the receiver. The ultimate aim of this process is to bring about the desired change.

**The first author is with the College of Agriculture, Bijapur, Karnataka and the rest with CSR&TI, Mysore.**



# Mulberry Sericulture in Tripura

P. Borpuzari, R.N. Singh and P.K. Mukherjee

**T**ripura, the southernmost part of North-eastern region has a potential and good climate for mulberry cultivation. The Government of Tripura has made intensive and integrated efforts to popularise sericulture in the state, with an objective of improving the

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***Mulberry sericulture introduced recently in Tripura is expected to play a key role in generation of ample rural employment. With its initial achievement, the industry presently in its infancy, needs integrated approach and continuous support of the policy makers to make a head way. Presented here is a brief account of the status of the industry in the state.***

---

rural economy by providing gainful employment through sericulture. Mulberry sericulture in the state was introduced during 7th plan period on domestication basis. The progress of sericulture in the last five years indicate that its growth in terms of import parameters viz., acreage of mulberry



***Mulberry plantation in Agartala***

plantation, number of rearers engaged, production of dfls and cocoons has increased considerably. During 1988-89, the area

under sericulture was only 1254 acre of which mulberry plantation was less. Now, mulberry plantation alone covered around 1580



***Silkworm rearing under hygienic conditions***





**Cocoon drying Chamber**

acre, thus, recording a five time increase within a decade. Similar trends have been observed in employment generation and production of cocoons. There has been a steady increase in the cocoon production inspite of lack of infrastructure, to the tune of 23,500 kg. However, during 1990-93, there was a sharp decline in mulberry sericulture due to insurgency. At present, the industry has again picked up and an allocation of Rs. 595 lakh has been made in the 9th plan as against Rs. 179.78 lakh in the 8th plan.

Sericulture is practised in all most all the districts of the state; but more emphasis is in South and West Tripura districts. In these two districts mulberry plantation is done in clusters. In each cluster, there is a Mulberry Rearing Co-operative Society which provides technical guidance to the rearers. Apart from this, there is a Mulberry Extension Service Centre which provides chawki silkworms to the farmers, free of cost. Altogether, there are six mulberry rearing co-operative societies and

18 mulberry extension service centres which look after the rearing performance of rearers at their door step. This has given an awareness among the farmers about the benefits of mulberry sericulture.

The Central Silk Board has conducted field trials of some important varieties of mulberry plants and hybrid races of silkworm to asses their performance. Studies indicate that  $S_1$ ,  $S_{1635}$ ,  $S_{1708}$ ,  $K_2$  and  $Tr_{10}$  varieties are more suitable to this region. Total yield per year varies from 8000-10,000 kg per acre under rainfed conditions. Similarly, suitable silkworm races have also been tested. Their field trial report has given encouraging results. Multi x bi ( $M_1 \times NB_4 D_2$ ) and ( $PM \times NB_4 D_2$ ) found to be the most suitable races which can be commercially exploited.

With a view to facilitate greater participation and active involvement of women in sericulture, the Government of Tripura has launched a "Tripura Women Sericulture Project" with a financial outlay of Rs. 403.458 lakh. The Central Silk Board is also providing financial assistance to this Project under the North-East

Action Plan on Mulberry. The objective of the project is to ensure increased participation of women in sericulture, to create awareness among them about their rights and responsibilities, to upgrade the skills of women by providing appropriate technology support and thereby, increase their income.

Initially, the project has been implemented in two districts viz., South Tripura (Matabari, Amarapur and Bagala Blocks) and South Tripura (Bishramganj, Jirania, Jampuijala and Takarjala Blocks). Four clusters covering two villages have been screened in each block and 24 trained Mahila Resham Karmic (MRK-Women Sericulturists) were selected to monitor the activity during plantation and rearing period. These MRKs are from local areas and act as a friend, philosopher and guide to the identified target group of rearers. The entire sericulture activity in each cluster is co-ordinated at the block level. State sericulture department has deputed its technical staff for necessary guidance to the beneficiary. One woman supervisor is also deputed to work at village level to encourage the woman folk.

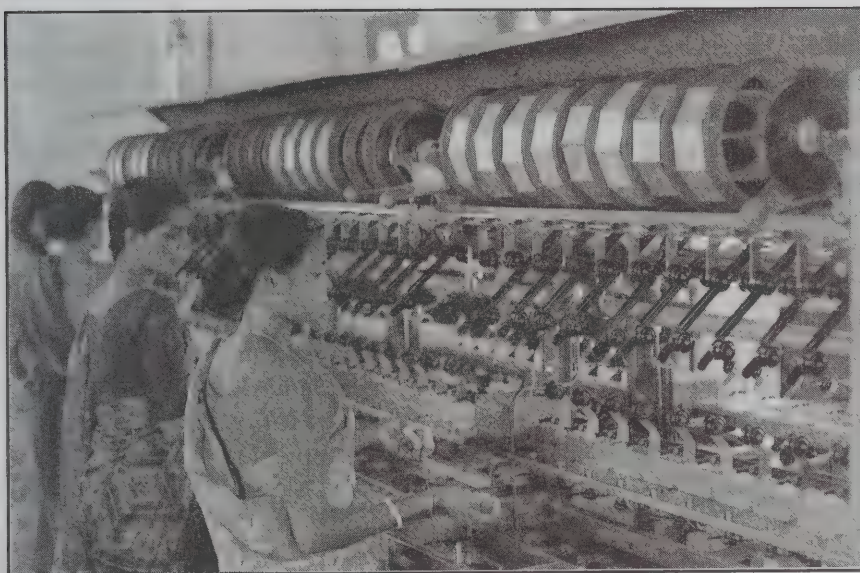


**Cocoon purchase by the cooperative society**





*Reeling of cocoons in progress*



*Multiend reeling machine in operation*

All the beneficiaries covered under the Project are recognised as a member of Women Sericulture Co-operative Society at the block level. The activity of these blocks

is coordinated at state level by Tripura Apex Weavers Co-operative Society.

The Society has a project cell headed by a Project Director which

takes up mulberry sericulture as a medium of socio-economic development for women in the state. The women groups have been imparted two month stipendary training on sericulture covering various activities like mulberry plantation, silkworm rearing and reeling on advanced charkhas. Apart from this, study tour to sericulturally advanced states like Karnataka, West Bengal etc., is also organised to expose the trainees to the advanced techniques of sericulture practised there. These well trained farmers have opted sericulture because of secured market as the Rearers Cooperative Society will purchase the cocoons from the farmers in cash at prices fixed by the state government depending on the grading of the cocoons. Thus, the assured market for their cocoons has prompted the farmers to venture into sericulture.

Tripura has a congenial atmosphere for rearing of multi x bi races throughout the year which produces on an average 40 kg./100 dfls and one kg silk from 10 kg of green cocoons. Integrated efforts of both the central and state agencies to improve the quality and productivity will be a boosting factor for the development of mulberry sericulture in Tripura, in the coming years.

*The authors are with Regional Development Office, CSB, Guwahati.*

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# Sericultural Extension Management in China

Ch. Sathyannarayana Raju and R.K. Datta

**S**ericultural Extension Management in China is as old as the sericulture itself. Around 5000 years ago, Lei Zu, wife of a tribal chief, Huang Di (Han Wudi) was the first person who reportedly advised others to rear the silk-

---

***Farmer-oriented Extension Management has tremendously helped the Chinese Sericulture to attain its current status of the world leader in silk production. Considering the Chinese success, India can regard it as a role model for the rapid development and transformation of her sericulture industry. "Learning from the farmer's rich experience can be rewarding and beneficial for the researchers, extension workers and farmers" opine the authors.***

---

worms, thus known to have initiated sericultural extension. It is reported that the effective extension work was started in the year

1920 and its present structure can be considered as a model for the Indian sericultural development. Out of 29 provinces, 27 practice sericulture, with 20 million house holdings cultivating 2 million hectares of farm land and rearing 24 million boxes of silkworm seed every year. There are 1000 silk factories (with 2.4 million ends of reeling machines), employing a million workers.

Chinese believe that the past experience of the farmers and government is very important to develop sericulture. Technology alone is not enough since socio-economic conditions play a crucial role and decide the actual extent and speed of acceptability of the technologies by the farmers.

Chinese sericultural extension management system is an off-shoot of a very well organised, established and time tested agricultural extension system unlike in India where the sericultural extension system is given an independent status. Hence, one can easily perceive a noticeable gap between the agricultural and sericultural extension systems in India.

Chinese believe that the high yielding high quality agricultural/sericultural technology is the amalgamation of several technologies, which are inter-related and are effective only when combined together.

The three factors of a healthy sericulture developmental structure

viz., research, teaching/training and extension are the backbones of the successful present day Chinese sericulture industry. The extension staff were successful in improving the knowledge of the sericulturists by changing their attitudes and skills by employing an array of techniques which are simple and effective. It can be noted that extension staff gracefully accept the fact that all the new technologies are not their contributions but many a technology, in fact, had originated from the farmers.

The ways and means employed by the Chinese officials to take the messages to the sericulturists and the reciprocal response from the farmers is appreciable which is lacking in the Indian context. An improved relationship can go a long way in improving the overall silk cocoon output with better quality.

The following agencies are involved in sericulture development in each of the provinces:

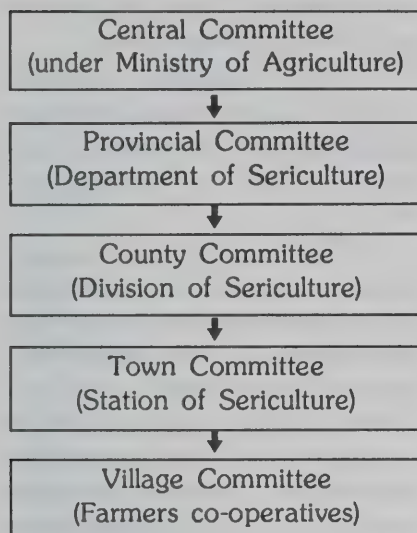
- Silkworm company
- Sericultural station
- Egg management station
- Egg cold storage house
- Research institute

## Sericultural Technology Generation

Sericultural technology comprising of productive silkworm breeds, mulberry varieties and the package of practices are gener-



## SERICULTURAL EXTENSION NETWORK



ated, developed and standardised at a number of research institutions/research centres and universities. In India only a few research institutes of the Central Silk Board and two states are involved in technology generation.

The Sericultural Research Institute (SRI) of the Central Academy of Agricultural Sciences (CAAS), Zhenjiang in Jiangsu province is the nodal centre for the generation of sericulture technology. There are 23 provincial research institutes and 12 agricultural universities supporting the nodal research centre.

The methods employed for evolving productive silkworm breeds and mulberry varieties are of sound scientific standard and the procedures prescribed for testing them before being released to the field are rigorous and time consuming. The national government at Beijing has a firm control over the whole system, through a number of commissions/committees at various levels.

### Funding Sources for Sericultural Extension

Funds for sericulture extension come from both the government

and the department itself. There are four major heads of funding which are sufficient to sustain the effective extension services. They are :

- National government
- Technique reform fee collected from the enterprises such as silk factories.
- In addition whenever a new mulberry variety or a silkworm hybrid is released to the field, the provincial silk factory which is indirectly benefitted should pay a substantial amount to the extension department, which may be about 1 to 3% of the total profit.
- Extension department also generates income through sale of chemicals, appliances etc. There are 200 factories permitted to manufacture various kinds of patented chemicals, mostly disinfectants. These disinfectants are priced in accordance with their market demand.

### Salient Features

- ☆ Sericultural extension management system is farmer-oriented.
- ☆ Sometimes, farmers reform the technique or altogether develop a new technique which becomes a technology in due course of time.
- ☆ Participation of women in sericultural activities is remarkable at silkworm rearings, silk reeling, weaving and fabric making. How-

ever, at administrative levels their participation is low.

☆ Unlike in India, language is not a barrier in China, "Putung hua" is the official language.

☆ At all levels of administration, apart from the departmental officials there are peoples' representatives in all decision making bodies including universities, colleges and other academic organizations which facilitates proper presentation of farmers' problems.

☆ The technicians gather the technique from farmers and improve them. Farmers know how to do, technicians know why to do.

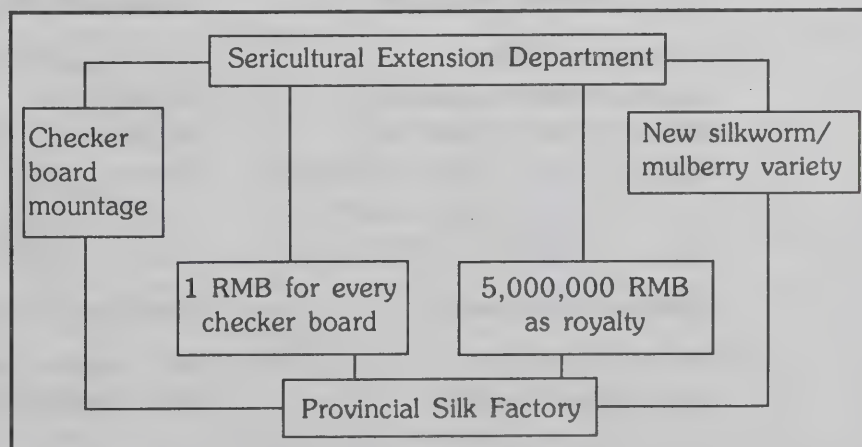
☆ Most of the farmer technicians have specialized education (under graduates). Some attended training courses. Others have passed some tests.

☆ While higher officers/cadres have more knowledge and less practical experience, the farmer technicians have lot of experience and operational ability.

☆ To improve the knowledge level of the technicians, schools, correspondence courses on radio/postal and other short term courses are being conducted.

☆ Disinfection squads are formed by the farmers themselves for mass disinfection. This squad is paid by the beneficiary farmers.

☆ Government encourages group sale of cocoons hence every



farmer strives to produce good cocoons.

☆ While the rearers are allowed to do other agricultural activities during young silkworm rearings, during the late age rearings, they are advised to concentrate fully on silkworm rearing.

☆ Government provides subsidy for construction of grainage building, co-operative chawki rearing centre and card board mountage @ 3 RBM for one unit.

☆ Application of higher dose of organic manure, optimum use of waste from piggery, fisheries and garbage after decomposition as organic manure are some of the unique features of extension system.

☆ Sale of rearing material is by the Ministry of Commerce and egg supply is made to only those who have proper infrastructural facilities.

☆ Hormonal application is a common feature even in the remote villages. All the chemicals required are supplied by the extension department at highly subsidized prices. A few private shops are also issued licenses to sell the chemicals and hormones.

☆ In between rearings, the mulberry fields are effectively used to grow vegetables for additional income. Similarly the rearing rooms are also used for some economically viable activities.

☆ It is noteworthy that the staff members of the sericulture department work in various other departments when the silkworm rearings are not there. The infrastructure facilities are rented out to various departments.

☆ During the rearing seasons all the local television and radio stations broadcast/telecast exclusive programme on sericultural

activities repeatedly, every day. Any sudden changes in the weather are informed to the sericulturists within a very short period.

☆ Any hazardous industries around mulberry plantations and silkworm rearing houses are banned during the rearing seasons.

☆ Un-interrupted power supply is ensured to the incubation centres even when the residential lines and other places are not having electricity.

☆ Considerable amount of awareness is created among the sericulturists that the income generated from the sericultural by-products and through recycling of natural resources could be much higher than the actual income from the cocoon sale.

*The authors are with Central Sericultural Research and Training Institute, Mysore*

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OLIVE



# Delicious Delicacies from Nutritious Mulberry

Sarita Srivastava, Rashmi Kapoor and R.P. Srivastava

**G**reen leafy vegetables are the cheapest but excellent sources of calcium, iron, beta-carotene vitamins, good in riboflavin and folic acid content. Green leaves of spinach, amaranth, fenugreek, mint, drumstick etc. are consumed as vegetables. I.C.M.R. (1991) has

**Mulberry leaves, rich in protein and vitamins, are rarely used as food by human beings. A string of delicacies, which are equally tasty and nutritious like any other leafy vegetables, can be prepared out of mulberry leaves. The article contains a menu of such enriched esculent.**

recommended the use of 50 gm leafy vegetables per person per day for good nutrition.

Mulberry leaves are rarely used for food purpose, though reports indicate that they are quite nutritious and non-toxic. Leaves are used as feed for cattle with no adverse effects. Occasionally they are used by rural people for food.

A comparative evaluation of nutritional quality of mulberry leaves and spinach is presented in

Table 1. Several compounds of calcium, phosphorus, silicon, manganese, magnesium, iron, copper and zinc etc. besides abundant amount of vitamin C are also found in mulberry leaves.

Paratha, pakoda, saag, dhokla and steamed products were prepared (variety CM) for evaluating quality characteristics of mulberry with spinach. The fresh leaves were collected from mulberry nursery.

All the preparations were made from the third and fourth leaves during winter 1996.

## Paratha

### Ingredients

Wheat flour	100 g
Mulberry/spinach leaves	50 g
Salt, red chilli	To taste
Oil	8-10 tsp

### Method of preparation

- Wash and chop the leaves.
- Add salt, red chilli & chopped leaves to the flour and knead into dough.
- Make balls of equal size.
- Prepare square-shaped parathas over heated plate using 1-2 tsp oil per paratha.

## Pakoda

### Ingredients

Gram flour	50 g
------------	------

## Mulberry/spinach

leaves	50 g
Salt, red chilli	To taste
green chilli	1
Oil to fry	

### Method of preparation

- Wash leaves and chop finely.
- Add salt, red chilli & chopped leaves to flour.
- Heat oil.
- Prepare batter of moderate consistency.
- Prepare in hot oil and take out when pakodas turn golden colour.
- Serve hot with chutney/sauce.

## Saag

### Ingredients

Mulberry/Spinach leaves	100 g
Tomato	75 g
Onion	50 g
Green chilli, ginger, garlic paste	5 g
Oil	1-2 tsp
Salt	To taste
Methi seeds	1/2 tsp

### Method of preparation

- Wash and cook chopped leaves in a pressure pan.
- Grind into paste.
- Grind onion, green chilli, ginger and garlic.
- Chop tomatoes.
- Heat oil in karahi, put few methi seeds.

Table 1. Nutritive value of mulberry and spinach(%)

	Moisture	Fat	Protein	Minerals
Mulberry	81.75	0.6	6.8	3.6
Spinach	92.10	0.7	2.0	1.7

Table 2. Comparative evaluation of cooked weight of products of mulberry leaves and spinach(gm)									
Paratha		Pakoda		Saag		Dhokla		Steamed product	
Leaf quantity	weight	Leaf quantity	weight	Leaf quantity	weight	Leaf quantity	weight	Leaf quantity	weight
Mulberry-50	60	50	165	100	210	40	250	50	150
Spinach-50	60	50	125	100	195	40	220	50	145

- Add onion-chilli paste.
- Fry till it turns golden colour.
- Add chopped tomatoes and salt.
- Fry till oil is seperated.
- Add paste of the leaves and little water if paste is too thick.
- Simmer till it gets cooked.

### Dhokla

#### Ingredients

Mulberry/	
Spinach leaves	40 g
Bengal gram dal	80 g
Soda	A pinch
Salt, chilli	To taste

For garnish :

Few methi seeds,  
curry leaves

Lemon 1

#### Method of preparation

- Soak dal for 5-6 hours. Grind to paste.
- Keep overnight to ferment.
- Wash and chop leaves finely.
- Beat the fermented dal for two minutes.
- Add soda, salt, chilli, chopped leaves.
- Steam for 20 minutes.
- Cut into pieces of equal size, once it is cooled.
- Season with methi seeds and

- curry leaves.
- Add lemon.

### Steamed Product

#### Ingredients

Bengal gram dal	25 g
Green gram dal	25 g
Mulberry/spinach leaves	50 g
Salt, chilli	To taste
Oil	5-10 g
Fenugreek seeds	1/2 tsp

#### Method of preparation

- Soak both dals for 3-4 hours. Grind.
- Beat properly for few minutes. Add salt and chilli.
- Chop the washed leaves.
- Add chopped leaves to the paste. Mix well.
- Steam for 15-20 minutes.
- Take out and cut into pieces of equal size.
- Season with methi seeds.
- Serve with chutney.

### Yield of cooked products of mulberry :

Data on cooked weight of different products of mulberry leaves and spinach with similar amount of leaves and other ingredients is given in Table 2. The table shows higher yield in terms of weight of all the cooked

products except paratha of mulberry leaves than spinach. Spinach contains 92.1% moisture whereas mulberry leaves contain 81.75% moisture. Hence, higher loss of moisture in spinach on cooking compared to mulberry leaves seems to have resulted in lower yield of cooked products of spinach.

**Sensory quality evaluation of mulberry leaf products :** All the products prepared were evaluated for sensory quality characteristics using paired comparison test by semi-trained panel consisting of 10 members. The data is presented in Table 3.

The test showed that paratha and dhokla prepared from mulberry leaves were liked more and steamed product was liked less as compared to those prepared from spinach. Pakoda and saag of both mulberry and spinach were equally liked.

The products prepared from mulberry leaves were acceptable and two of them were even preferred to spinach products.

The study thus establishes the acceptance of different mulberry preparations which may enter the already established world of green leafy products.

**The authors are with Department of Foods and Nutrition, College of Home Science and G.B. Pant University of Agriculture and Technology, Pantnagar (UP).**

Table 3. Preference for food products of mulberry leaves and spinach (%)					
	Paratha	Pakoda	Saag	Dhokla	Steamed product
Mulberry	60	50	50	70	40
Spinach	40	50	50	30	60

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## Tasar Krishi Mela



*The dignitaries going round the exhibition arranged during Krishi Mela*

A one-day 'Tasar Krishi Mela' was organised at Katghora, Bilaspur district, Madhya Pradesh on March 6, 1997 by the Research Extension Centre, CTR&TI, Katghora.

Inaugurating the Mela, Shri Harsamandar, IAS, Commissioner, Bilaspur division stressed the need to boost tasar production in the area and assured all help in this endeavour. Dr. R.K. Singh, Vice Chancellor, Guru Ghashi Das University, Bilaspur, who presided, said that the university would start a diploma course in sericulture.

Various aspects of tasar industry - primary resources, food plants, rearing, seed technology, post cocoon technology and marketing were explained to the farmers by the officers of Central Silk Board and the Department of Sericulture.

A 'Krishak Sangoshti' an exhibition on tasar culture and distribution of publicity material were the sidelights of the programme in which more than 500 farmers and weavers participated.

**(Report : S.K. Tiwari, Asst. Director, REC, CTR&TI, Katghora, M.P.)**

## AEPC to set up trade complex

As a part of export promotion programme, Apparel Export Promotion Council (AEPC) will be setting up a trademart-cum-exhibition complex at NOIDA.

The complex will have a large area for exhibition of textiles and garments besides a trademart to house showrooms of garment exporters permanently. This will enable foreign buyers to view all products under one roof. A conference hall for seminars and workshops has also been planned.

The complex will be a gain for NOIDA which will attract garment exporters to set up units providing employment opportunities.

## CAD Centre at Bhiwandi

A Computer Aided Design (CAD) Centre, established by SASMIRA at Bhiwandi in Thane district of Maharashtra with the assistance of the Union Ministry of Textiles, was inaugurated recently by Shri Prabhat Kumar, Secretary (Textiles). The function was also attended by Shri B.C. Khatua, Textile Commissioner.

The basic objective of the Centre is to assist the decentralised powerlooms sector to increase its designing capabilities and to use computer based methods for marketing their products in domestic and international markets.

The Centre offers both designing service facilities and training in operating computer systems to generate textile designs for production on powerlooms as well as printing. SASMIRA is running two powerlooms service centres in Bhiwandi offering technical services, testing facilities and weavers training courses. The new CAD centre would further help the powerloom industry in developing the fabrics based on the computer designs.

Bhiwandi is one of the major powerloom centres in the country. Its main products are shirting and dress materials. The industry which was hitherto competing with the organised mill sector in the domestic market, will now have to face global challenges due to liberalisation of policies by the government. This challenge in marketing scenario necessitates appropriate changes in production techniques. The Ministry of Textiles realising the basic necessities of the weaker section of the powerloom sector has initiated measures to support this sector.

## World Textile Congress 9-10 July, 1997

'Natural and natural polymer fibres' is the theme of the World Textile Congress, 1997, an annual event organised by the Textiles Department at Huddersfield University, U.K. on 9 and 10th July, 1997.

The Congress will feature wide-ranging papers on all aspects of the various natural fibres used in the textile application. The topics, *inter alia*, will include

- Industrial Products from renewable raw materials
- Enhancing the flame retardency of natural and natural-polymer fibres.
- Pro-ecological utilisation of flax and hemp for cloths production.

For further details, contact :

Dr. K.L. Gandhi/ Dr. G.E. Cusick

Tel : +44 1484 472409

Fax : +44 1484 516151

### A new fashion show concept

India International Trade Centre (IITC) fashion show concept visualises a genuine need for practical exposure to its designer students. With a view to improve their skills, IITC provides a platform to demonstrate their talents in fashion designing.

The centre has so far organised fashion shows in Pune, Mumbai, Bangalore, Surat, Baroda, Ahmedabad and Jaipur which have enabled the budding designers to reveal their talent and creativity through a wide array of collections.

## Baltic Textile and Leather Fair in Vilnius

The Sixth Baltic Textile and Leather Trade Fair, organised jointly by Messe Frankfurt and the Lithuanian Light Industry Association, will be held at Litexpo Exhibition Centre in Vilnius, Lithuania, from 9-12th September, 1997.

The Baltic Textile & Leather is aimed primarily at manufacturers of :

- textile machines and equipment.
- making up/contract processing
- house hold/home textiles and garment fabrics
- Furs and leather goods

Most of these manufacturers come from the Baltic states, CIS countries and all of Europe. The

trade fair is also regarded as a contact forum for gaining access to the Russian market. The organisers have made a number of conceptual changes to ensure the fair can continue to build on its position as the most important event for the regional textile and leather processing industry and as the international meeting place for the sector. Additionally, a new product group - textiles machines - will also be introduced.

The Lithuanian Investment Agency gives foreign participation in the textile and leather industry. Today, textile and leather processing ranks as the most important and up-to-date branch of industry in Lithuania.

## Europe Selection in Hong Kong

The Fifth Europe selection will be held during the Hong Kong Fashion week at the Hong Kong Convention & Exhibition Centre from 16-19 July, 1997.

European fashion labels gain more and more ground on Asian markets. Labels from Italy continue to be in the lead followed by France and Germany. Approximately, 40 exhibitors will participate in the event representing Germany, Italy, Spain, Austria, Greece, Switzerland etc.

Europe selection is a joint venture between Igedo Company, Organiser of the world's largest fashion fair CPD in Dusseldorf and Ente Moda Italia, Milan, Florence Promoter of Italian fashion worldwide. The event is designed to introduce more fashion



dealers to European fashion producers.

The organisers, EMI and Igedo Company, will develop and extend the concept of Europe selection to other Asian countries.

Igedo Company/Dusseldorf

Tel : ++ 49/211/4396-391

Fax : ++ 49/211/4396-450



## ITMEX '97

ITMEX '97, the 8th Guangzhou International Textile Exhibition, will be held at Guangzhou International Exhibition Centre, China from September 2-6, 1997.

ITMEX has been receiving international attention since its debut in 1983 and regarded as the most influential textile event in China. The exhibition features a wide range of products including the equipment and technology for chemical fibre, cotton, textile, printing and dyeing, manufacturing machinery and attachments, testing and analysis equipment, environmental conservation, management of information system and other related technologies and machinery.

New technology and machinery are now considered as the prime elements for Chinese textile producers to improve the products quality and production effectiveness.

The textile industry of China projects great potential and it is expected that the export value of textile products will reach US \$55 billion in 2000.

The exhibition is organised by the sub-council of Textile Industry, China council for the promotion of International Trade (CCPITTEX), the Guangdong sub-council of China Council for the promotion of International Trade (CCPIT), Guangdong Textile Industry Corporation and Business Industrial Trade Fairs Ltd.

The four-day exhibition brings together top executives from supplies and manufacturers worldwide. For further information contact : Business & Industrial Trade, Fairs Ltd., 4/F Antel Building, 144-148 Des Voeux Road Central, Hong Kong.

## Intertextile in Shanghai

The third Intertextile, a classic fair for home textiles and carpets, will be held in Shanghai, China from October 27-29, 1997.

The representatives of the industry have indicated that the trade fair has achieved international recognition. The success of last year's Intertextile, discussion with exhibitors and exports from the sector and the company's experience have prompted Messe Frankfurt to hire more exhibition space for Intertextile 1997.

The fair a joint venture by Messe Frankfurt, the sub-council of the Textile Industry (CCPIT) and the China's Textile International Exchange Centre (CTIEC) is regarded throughout China as being highly significant.

Besides trend forums and specialist seminars, the visitor attrac-

tions in 1997 will also include fashion shows based on fabrics supplied by the exhibitors.

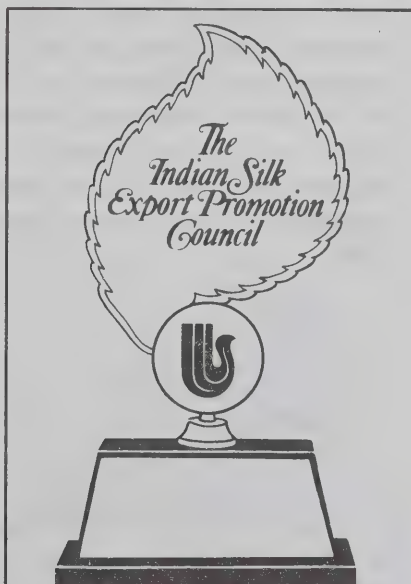
China is the world's biggest potential market for garments. As their income rises, the Chinese are attaching increasing importance to fashionable, high quality clothing.

Messe Frankfurt can arrange a special combined travel package for exhibitors and visitors wanting to attend both Interstaff Asia Autumn in Hong Kong from October 15-17, 1997 and the Intertextile in China.

For further information contact :

Messe Frankfurt  
(Affn: Ms. Daniela Karg)  
Ludwig-Erhard-Anlage 1,  
D-60327 Frankfurt am Main,  
Germany.

## Export Awards 1996-97



The Indian Silk Export Promotion Council (ISEPC) proposes to grant Export Awards for outstanding export performance in natural silk goods during April 1, 1996 to March 31, 1997.

Gold, Silver and Bronze trophies will be awarded to the leading exporters in 'Overall, Fabrics, Garments, Sarees, Carpets and Made-up' categories.

Awards will be granted on the basis of chartered accountant certified annual export returns filed with the council by the members on or before 30th June, 1997. The application should be sent in the prescribed format already supplied by ISEPC to its members.

## Textile trading via Internet

It is the first of its kind in the country. Not just information, but it brings the textile industry to the very market place. Instead of spending thousands of dollars, companies can surf on the Internet and post their offers and receive inquiries on various fields by spending a few minutes on the computer.

This is how the Global Textile Network Inc. (GTN) casts its net over the prospective subscribers to its new services in India. Fiftyfive companies have already become the members and the number is likely to swell to 500 in another year.

The membership fee for the GTN service is US \$1200 per annum and already 31 countries have been covered. By 1998 GTN has targeted a membership of 3000 with atleast 500 from India.

At the heart of the GTN is the trading and sourcing centres. Each segment of the industry - fibre, yarn, fabric, apparel, home furnishing, industrial and institutional products, embroidery etc., will have its own trading area dedicated to that product category. These are where the sellers and buyers can post and view their offers and inquiries and further negotiations and trading from this point are completely private. GTN has its own internal e-mail system called GTN Mail.

GTN (India) is headed by Shri R.K. Shah and he looks after the operations in India, Bangladesh, Sri Lanka and Nepal. GTN was launched on the inaugural day of the 1996 Bobbin show in the U.S. and later joined into a partnership with La Commercialle of Geneva, Switzerland.

## Government to regulate textile processing

The Textiles (Development and Regulation) Order, 1993, has been amended by the Government to bring the processing industry under its purview. This has been done with the objectives of modernising the processing industry to ensure exports of high quality value-added textiles and the use of banned dyes is totally eliminated.

The processing units have been accorded time upto ten months to register with the Textile Commissioner. The Textile Commissioner, Mumbai will issue instructions periodically regarding installation of processing machinery quality control measures and the dyes and chemicals to be used. The proce-

dures drawn up by the Union Textile Ministry envisages submission of 'Information Memorandum' by all existing and new processing units.

The processing industry so far was unregulated. The decision to regulate the industry has come about because it is felt that the Indian textiles sector should have a suitable infrastructure ensuring quality and adherence to international standards. Simultaneously the Government has initiated several steps such as to allow import of capital goods for processing industry at concessional import duty and setting up of eco-testing labs.

### Eco Laboratories

Three Eco Laboratories for the testing of banned Amines (Azo free testing) and other eco parametrs have been set up at Mumbai, New Delhi and Tirupur by the Textile Committee, Union Ministry of Textiles. These laboratories are already functional, the addresses of which are given below :

- Director,  
Laboratory,  
Textiles Committee,  
Crystal, 79,  
Dr. A.B. Road,  
Worli, Mumbai-400 018.  
Tel - 4935864, 4934555  
Fax - 4934555
- Dy. Chief Inspecting Officer,  
Textiles Committee,  
41, Community Centre,  
Industrial Area,  
Phase-I,  
Naraina,

New Delhi-110 028.

Tel - 5795241, 5792364,  
5793722

Fax - 5795241

- Inspecting Officer,  
Textiles Committee,  
10, B.S. Sundaram Road,  
D.L.M. Gin & Press Factory  
Tirupur-638 601  
Tel - 702500

The Committee is also in the process of setting up eco laboratories at Cannanore, Chennai, Jaipur, Ludhiana and Madurai and these are expected to be functional in the last quarter of 1997.

The Central Testing Laboratory, Textiles Committee, Mumbai and its 14 Regional Test Houses located all over the country already offer quality testing facilities of fibre, yarn, fabrics, garments and made-ups.



## **Igedo and EMAP Launch Joint Venture**

'The E&I Company' is the new joint venture formed by the Igedo company and the Emap Plc. which will specialise in fashion exhibition organisation and to develop pure womenswear into the Number One womenswear show in the U.K. The joint venture is a strategic combination of international fashion marketing expertise.

Igedo (Germany) is the world's largest fashion exhibition organiser and Emap is the UK's market leading media group and event organiser. Emap publishes the UK's leading business fashion titles in women's wear, children's wear and textiles etc. Igedo is the largest organiser of women's wear events such as CPD, IGEDO, IGEDO Dessous & Beach in Dusseldorf, Dessous China in Shanghai, Europe selection in HongKong and Avenida Moda in Miami.

The new company unites two market leading companies with entirely complementary and reinforcing skills, expertise and attitudes. This unique combination of the global knowledge, exhibition expertise will combine to create a London women's wear event of international stature. The company's long term objectives for pure womenswear are to stimulate the growth and promote the creative ability of British fashion.

Igedo's international sales network will attract a comprehensive range of new womenswear collections to present to the UK market by the retailers.

Both the partners of the E & I company have positive assets which will create substantial synergy for Dusseldorf and London. Potential buyer and exhibitor groups will be exchanged by the

two companies now and those customers will be encouraged to use both venues for their future international expansion.

Pure womenswear is edited into five distinct sections, Designer, Diffusion, Classic, Impact and Accessories. The new joint venture has been formed in time to fully organise the next edition from August 17-19, 1997 at Grand Hall, Olympia, London.

For further information, contact:  
Emap Fashion : Augusta Barnes,  
Communications Manager  
+ 44 (0) 171 417 2969  
Igedo company : Margit Jandali,  
Petra Hartmann  
+44(0) 211 43 96 01

## **Avenida Moda in Miami, USA**

Avenida Moda, the international fashion and footwear show for the Americas will be held in Miami, USA from 10 to 12th August, 1997.

Italy, the prominent fashion export nation in Europe, will be represented at the show by over 60 companies only. As such, the fair offers a powerful group participation, which is organised by ICE, Roma. The product range includes womenswear, menswear, children's clothing, body/beachwear and footwear.

Having pioneered fashion exports from the beginning, Italy is aware of market conditions in Latin America, which is experiencing an unprecedented boom.

Igedo company, organisers of the world's largest fashion fairs, will handle the entire apparel and accessories sector. Local trade and industry have shown a vivid interest in the event.

The 1998 dates of AVENIDA MODA.

25-27 February  
9-11 August.

## **Indian Product Show at Los Angeles**

A trade show with special emphasis on Indian products will be organised at Los Angeles in USA during October/November, 1997. With the emerging interest in the American market for Indian goods and Los Angeles being the major centre for trade on the West Coast of America, the trade show offers Indian companies a good opportunity to participate and exhibit their products.

Organised by M/s. Cate Development Inc., a company specialising in organising trade fairs with particular emphasis on Asia, with the assistance of the Consulate General of India, the product profile includes a wide spectrum of Indian products which could be marketed by Indian companies in the United States.

For further details contact :  
Consulate General of India,  
540 Arguello Boulevard,  
San Francisco,  
CA 94118, USA  
Tel : 6680662  
Fax : 6687968

## **Kirloskar entering silk business**

Kirloskar Brothers Ltd. (KBL) plans to enter silk business in a big way and is exploring the possibility of a tie-up with a Japanese silk giant.

KBL is planning to put up a 200-tonne per annum capacity plant for manufacturing value-added grade of silk. It has chalked out a Rs. 60 crore plan and procured around 400 acre of land at Nashik in Maharashtra for the purpose.

Presently Tata Industries is the only company which plans to manufacture this superior quality grade of silk. It is setting up a joint venture - Oriental Seritech - at Nashik in technical collaboration with Mitsubishi corporation of Japan.

Oriental Seritech plans to produce bivoltine raw silk against the traditional multivoltine production in the country. Internationally, bivoltine silk is used for producing high quality silk fabrics. Currently.

## Mela to popularise Tasar

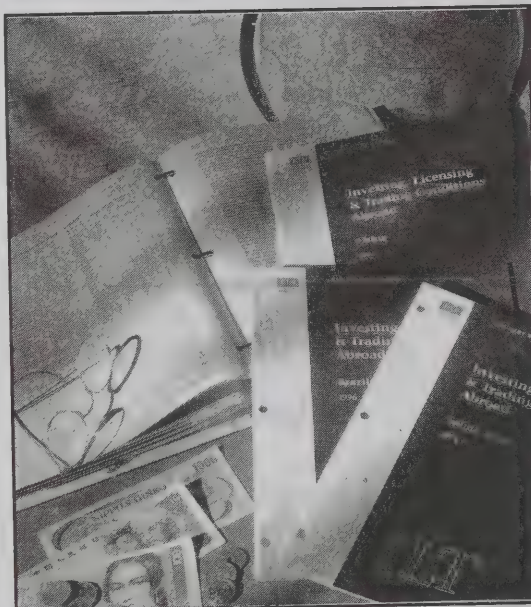
Shri N.K. Sundaray, IAS, Collector and District Magistrate, Mayurbhanj inaugurated a one-day Krishi Mela on Tasar Culture at Baripada, Mayurbhanj District, Orissa on March 20, 1997.

Organised by the Regional Tasar Research Station, Baripada, Shri Sundaray appealed for a concerted effort by the Central and State agencies for rapid development of sericulture in the state. He said that the host plant of tasar silkworm will be given priority in the district plantation programme. He also opined that periodical arrangement of melas and exhibitions in nearby cities and towns is essential to explore new pockets of demand and to popularise silkgoods among people.

Officers of RTRS, BSMTC, Baripada and REC, Bargriposi presented papers in the technical session. Shri G. Hansda, SRO, CTRTI, Ranchi gave an account of the objectives of the Mela.

**Report : V. Kulshrestha, SRO, Regional Tasar Research Station, Baripada.**

# Investing, Licensing & Trading conditions Abroad



Investing, Licensing & Trading Conditions Abroad (ILT), published by the Economist Intelligence Unit is a complete reference service aimed at helping a company to keep abreast of the latest laws, rules and regulations worldwide. Hailed as a complete business guide for international operations, ILT provides comprehensive local operating conditions in 60 countries.

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ments, corporate and personal tax treatment, licensing conditions, investment incentives, rules on foreign investment, labour conditions, export credit, local capital resources, local attitude towards private sector and foreign investment, competition and price control policies, intellectual property protection and foreign trading conditions.

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0171 499 9767

**T.G. Rajappan, Indian Silk,  
Central Silk Board, Bangalore.**



# Textile Trade Fairs – 1997

<i>Date</i>	<i>Exhibition</i>	<i>Place</i>
1997 Jul	<b>INDIA</b> <b>NATIONAL GARMENT FAIR</b> Garments Venue : N.S.E. Complex Contact : C.M.A.I. Ph : 022-4928245 Fax: 022-4938547	Mumbai
Jul 25-27	<b>INDIA GARMENT FAIR</b> Garments Contact : A.E.P.C./C.M.A.I. Ph : 022-2845479/2853419 Fax: 022-2043178	New Delhi
1997 Jun 20-23	<b>OVERSEAS</b> <b>HONG INTERNATIONAL APPAREL FAIR</b> Contact : Miller Freeman Asia Ltd., Wanchai Ph : 852-2-8275121 Fax: 852-2-8277064	Hong Kong
24-26	<b>TEXTILIA EUROMODE</b> Womens, mens and childrens fashion, underwear, beachwear, accessories Contact : Link International S.A., Athens Ph : 30-1-363 0015 Fax: 30-1-363 2670	Thessaloniki Greece
29-02	<b>SPECTRA</b> Textiles and clothing Contact : 37, Kingly court, Kingly street London W1R 5LE Ph : 44-171-4391271 Fax: 44-171-4340813	Novosibirsk Russia
Jul 03-07	<b>BANDUNG TEX '97</b> Textile and garment machinery and accessories Contact : Jl. P. Jakarta 141 blok B/9, Ph : 62-21-6493717/3727 Fax: 62-21-6390062	West Java Indonesia
04-07	<b>SEHM</b> Menswear, leather garments, accessories Venue : Porte de Versailles Contact : Promosalons New Delhi 110001 Ph : 011-3317054 Fax: 011-3722660	Paris France

<i>Date</i>	<i>Exhibition</i>	<i>Place</i>
04-07	<b>INDO TEXTILE '97</b> Textile, apparel fabrics, underwear home textile and accessories Contact : Jl. P. Jakarta 141 blok B/9 Ph : 62-21-6493717/3727 Fax : 62-21-6390062	West Java Indonesia
16-19	<b>HONG KONG FASHION WEEK</b> Fabrics, ready-to-wear, accessories Venue : Hong Kong Conv. and Exhibition Centre Contact : Hong Kong Trade Development Council Ph : 852-2-58444333 Fax : 852-2-8240249	Hong Kong
16-19	<b>EUROPE SELECTION</b> Womens, mens, kidswear, body to beach wear Contact : Europe Selection S.r.l./Hong Kong Ph: 852-2-802 9902	Hong Kong
25-27	<b>IZMIR PRET</b> Textiles, ready-made garment fashion and textile machinery Contact : IZFAS – Izmir Fair Organization Ph : 90-232-4821270 Fax: 90-232-4254342	Izmir Turkey
Aug 01-03	<b>HERREN MODE-WOCHE</b> Casualwear and Young fashionwear Contact : Indo-German Chamber of Commerce, Mumbai Ph : 022-2186131 Fax: 022-2180523	Colonge Germany
01-03	<b>MEN'S FASHION WEEK</b> Mens fashion, suitings, jackets, sports and leisure wear Contact : Indo-German Chamber of Commerce, Mumbai Ph : 022-2186131 Fax: 022-2180523	Colonge Germany
01-03	<b>INTERJEANS</b> Sportswear and young fashion, jeans jackets, streetwear and shoes Contact : Indo-German Chamber of Commerce, Mumbai Ph : 022-2186131 Fax: 022-2180523	Colonge Germany

# Trade Enquiries

Sl. No.	Importers	Interested in
1.	Maya Overseas Foods Inc., 56-13 56th Drive Mespeth, NY 11378 Tel : (718) 894 - 5145 Fax : (718) 894 - 5178	Silk Apparel and Clothing
2.	Henry Bertrand (England) Ltd., 11-13 Melton Street London NW 12 EA U.K. Fax : (44) 0171 - 3834797	Silkgoods
3.	Gilles Marcel 1001 Centre Street, Santacruz CA 95060, Mail P.O. Box 8128, Santacruz CA 95061, USA Voice : (408) 427-2667 Shop : (408) 459-8223	Indian Silk Textiles for use in Furniture Upholstery
4.	Phoenix - Canada/Wholesalers Tel. : (905) 887-8877 Fax : (905) 887-8878 E. Mail : phoe@panix. com	Silk Products
5.	All technologie Inc. P.O. Box 18, East meadow, New York 11554 Tel. : (516) 7357070 Fax : (516) 5201086 E Mail : ati786@cris.com	Silk fabrics
6.	G & S Dye Accessories Ltd., 300 Steelcase Rd., W. Unit # 1 Markham, Ontario, L3R, 2W2, Canada Tel. : 905 4158559 Fax : 905 4158560	Silk Ties
7.	M/s. Bismoda Co. Ltd., 199, M004, Bankoh Muang Uttaradit, Thailand Tel. : (055) 44151-50 Fax : 66-055-414665	Silk, Raw fabrics
8.	Beth Houston Teja Geneva, Switzerland Tel. : (4122) 3292411 Fax : (4122) 3281120	Silkgoods
9.	Alta Moda Montebello, S.A. DE C.V. AV. Lomas Anahuac No. 133, Torre B-1402, Col. Loomas Anahuac Huixquilucan, 52760, EDO. DE MEXICO Tel. : (525) 2918806 Fax : (525) 2918788	Silk fabrics for ties



# वर्षाकाल में शहतूत पौधशाला की स्थापना : कुछ सुझाव

आर. कुमार, गार्गी, दीपक कुमार, प्रदीप शुक्ला व आर.के. पाण्डे

**श**हतूत वृक्षारोपण की सफलता, इसके प्रथम चरण, पौधशाला की स्थापना व उससे प्राप्त स्वस्थ पौधों की उपलब्धता पर निर्भर करता है। शहतूत पौधशाला की स्थापना का उपयुक्त समय वर्षाकाल व शरत् ऋतु के प्रारम्भ काल है क्योंकि इस अवधि में शहतूत के बागान की छंटाई से कलमें प्राप्त होती हैं।

प्रायः ऐसा पाया गया है कि प्रदेश के इस क्षेत्र में वर्षाकाल में कृषकों द्वारा लगाई गई पौधशाला से पौधों की उपलब्धता

यद्यपि वर्षाकाल, शहतूत पौधशाला की स्थापना के लिए उपयुक्त है, पौधों की कम उपलब्धता के डर से कृषक हिचकते हैं। पानी की निकासी एवं खरपतवार नियंत्रण की समुचित व्यवस्था होने पर, पौधशालाओं की स्थापना बहुत ही आसान होगी।

10 से 15 प्रतिशत तक होती है जो कि शरत् ऋतु में लगाई गई पौधशाला की तुलना में काफी कम (70 से 80%) है। इस कारण, पूर्वांचल के कृषक वर्षाकाल में पौधशाला लगाने से हिचकते हैं जबकि इसी समय शहतूत के कलम प्रचुर मात्रा में उपलब्ध होते हैं। इस ऋतु में स्थापित पौधशाला कुछ कम ही सफल हो पाते हैं जिसके दो मुख्य कारण हैं :

- (1) पौधशाला की स्थापना निचली भूमि में साधारण क्यारियाँ बनाकर करना तथा पानी की उपयुक्त निकासी के अभाव में पौधशाला में पानी का जमाव जिससे लगाई गई कलमें/नवविकसित पौधें प्रारम्भिक अवस्था में ही मर जाते हैं।
- (2) पौधशाला में अत्यधिक खरपतवार, मुख्यतः दूब व मौथा घास का उगना जो भूमि में लगातार उपलब्ध नमी के कारण तेजी से बढ़ती है। खरपतवारों की अधिकता का दूसरा



भूमि की सतह से उठी क्यारियों में कलम लगाने की विधि।

प्रमुख कारण लगातार वर्षा में निराई न हो पाना भी है। फलस्वरूप, खरपतवारों अंकुरित कलमों/नवविकसित पौधों को ढक लेती है जिससे उनकी वृद्धि रुक जाती है। वे प्रारम्भिक अवस्था में ही मर जाते हैं।

उपरोक्त दोनों कारणों का निवारण बहुत ही आसानी से किया जा सकता है तथा पौधशाला से पौधों की उपलब्धता का प्रतिशत 65 से 70 प्रतिशत तक बढ़ाया जा सकता है। इस प्रकार, पौधशाला की स्थापना में निम्न बातों पर ध्यान रखें :

पूर्वांचल के लिए उन्नत शहतूत प्रजातियाँ यथा, एस-146 या एस-1635 सिंचित अवस्था में अच्छी पैदावार देती हैं। कलमों को काटने व लगाने की विधि पूर्व-प्रचलित विधि जैसी ही है।

## पौधशाला का स्थान व भूमि की तैयारी

जहाँ तक सम्भव हो पौधशाला की स्थापना के लिए ऊँची भूमि का चयन करें जहाँ पानी का जमाव न होता हो तथा लगातार वर्षा के दिनों में पानी निकासी की समुचित व्यवस्था हो।

## क्यारियाँ बनाने की विधि

समतल भूमि में पौधशाला लगाने के लिए वर्षा प्रारम्भ होते ही भूमि को भली-भांति जोतकर क्यारियाँ बनायें। क्यारियों को भूमि की सतह से करीब 20 सेमी. ऊपर उठाकर बनाना चाहिए। इसके लिए 10 मीटर x 2 मीटर की क्यारी बनाकर उसके चारों ओर 30 सेमी. चौड़ी तथा 20 सेमी. गहरी नाली बनानी चाहिए तथा नाली की खुदाई से प्राप्त मिट्टी से क्यारी की सतह को ऊँचा करना चाहिए।

क्यारियों के तैयार होने पर उसमें 10 किग्रा. कम्पोस्ट या सड़ी गोबर की खाद छिड़ककर मिट्टी में मिला दें। करीब एक सप्ताह बाद क्यारियों में खरपतवार की नई कोपलें निकल आयेगी। इस समय, ग्लायसिल का 0.75 प्रतिशत घोल 4 प्रतिशत साबुन के पानी में बना लें। इस घोल में 2 किग्रा. यूरिया प्रति 100 लीटर घोल में मिला लें। इस प्रकार बने घोल को स्प्रेयर (जिसमें फ्लड जेट नोजल लगा हो) की सहायता से सभी क्यारियों व नालियों में छिड़क दें। ध्यान रखें कि छिड़काव के समय मौसम खुला हो व कम से कम छः घंटे तक वर्षा आने की सम्भावना न हो। इस प्रकार के छिड़काव के लिए एक एकड़ में 170 क्यारियों के लिए 200 लीटर घोल की आवश्यकता होगी। ग्लायसिल छिड़कने के 10 से 15 दिन के पश्चात् जब क्यारियों की घास पीली होकर सूख



साधारण क्यारियों में लगाई गई पौधशाला में खरपतवार का प्रकोप

तालिका : वर्षाकाल में शहतूत पौधशाला की स्थापना में ग्लायफोसेट के प्रयोग पर होने वाले व्यय का विवरण।

अ. 1. एक एकड़ के लिए ग्लायफोसेट की आवश्यकता	1.5 लीटर
2. ग्लायफोसेट की कीमत, रुपये 500 प्रति लीटर की दर से	रु. 750.00
3. आठ किग्रा. साबुन पाउडर की कीमत, रुपये 20/- प्रति किग्रा. की दर से	रु. 160.00
4. चार किग्रा. यूरिया की कीमत, रुपये 3.50 प्रति किग्रा. की दर से	रु. 14.00
5. एक मानव दिवस, रुपये 33 प्रति मानव दिवस की दर से	रु. 33.00
6. मृत खरपतवार को साफ करके क्यारियों को समतल करने पर होने वाला व्यय 15 मानव दिवस, रुपये 33/- प्रति मानव दिवस की दर से	रु. 495.00
कुल व्यय	रु. 1495.00
ब. पौधशाला की खरपतवार को निराई गुड़ाई द्वारा साफ करने पर प्रति चक्र होने वाला व्यय। 20 मानव दिवस एक चक्र में। कुल 100 मानव दिवस पाँच चक्रों के लिए होनेवाला व्यय रु. 33/- प्रति मानव दिवस की दर से	रु. 3300.00
ग्लायफोसेट प्रयोग करने से होने वाली बचत ब-अ (3300-1495)	रु. 1805.00

जाये तब उनमें गुड़ाई करके सूखी घास निकालकर भूमि को समतल करके कलमें (कतार से कतार की दूरी 20 से.मी. व कलम से कलम की दूरी 10 सेमी. रखते हुए) लगायें। इस प्रकार एक क्यारी में लगभग 900 कलमें आयेंगी। कलमें रोपित करने के बाद क्यारियों के बीच बनी छोटी नालियों को मुख्य नाली से जोड़कर पानी के निकास की समुचित व्यवस्था करनी चाहिए।

इस विधि से लगायी पौधशाला में खरपतवार की निराई से पूर्णतः बचा जा सकता है जो कि प्रचलित तरीके से लगायी जाने वाली पौधशाला में कम से कम पाँच बार करनी पड़ती है। इसके अतिरिक्त ग्लायफोसेट प्रयोग करने पर केवल 1500 रुपये का व्यय प्रति एकड़ होता है जो कि निराई-गुड़ाई पर होने वाले व्यय करीब 3300 रुपये प्रति एकड़ की अपेक्षा काफी कम है (तालिका)। इस प्रकार पौधशाला की स्थापना से करीब 1800 रुपये व्यय कम होगा साथ ही साथ उपलब्ध पौधों की संख्या का प्रतिशत बढ़ने से पौधशाला से होनेवाली शुद्ध आय भी काफी बढ़ेगी।

लेखक गण पूर्वांचल रेशम विकास परियोजना, वाराणसी, उत्तर प्रदेश में कार्यरत हैं।



# मिजोरम में रेशम उद्योग : एक विहंगम दृष्टि

**भ**ारत के उत्तर-पूर्व में 21,000 किमी. क्षेत्र में फैला एक छोटा सा राज्य है, मिजोरम। राज्य के तीन मुख्य जिलों आइजोल, लूंगली एवं छिम्पूति में नौ परगना तथा 20 प्रखंड हैं। इस छोटे से राज्य की विशेषता है, शहतूती, ओक तसर, मूगा तथा एरी रेशम का उत्पादन।

राज्य में रेशम उत्पादन का इतिहास अत्यन्त प्राचीन तो नहीं फिर भी इसका प्रारम्भ देश की स्वतंत्रता प्राप्ति के साथ हो गया था। दुर्भाग्यवश, पृथक राज्य की स्थापना होने तक रेशम उद्योग की प्रगति प्रायः धीमी ही रही। वर्ष 1970 में सरकार ने इस उद्योग के विकास में रोजगार की सम्भावनाओं को स्पष्ट रूप में पहचान कर न सिर्फ उपलब्ध शहतूत के वृक्षों से कीटपालन की दिशा में प्रयास किए वरन् आर्थिक पौधारोपण पर भी बल दिया। वर्ष 1985 में मिजोरम में रेशम निदेशालय की स्थापना कर क्रमबद्ध रेशम उत्पादन का लक्ष्य रखा गया।

मिजोरम में शहतूत का आर्थिक पौधारोपण मैदानी प्रान्तों के समान सम्भव नहीं है क्योंकि यह राज्य पहाड़ी क्षेत्रों से घिरा है। फिर भी गत वर्षों में रेशम कोसा उत्पादन लगभग 43,000 किग्रा. रहा तथा वर्तमान में, लगभग 5000 परिवार रेशम उत्पादन कार्यकलापों से जुड़े हैं। व्यक्तिगत कोसा विपणन केन्द्र स्थानीय रेशमकीट पालकों को समर्थन प्रदान कर रहे हैं। साथ ही, रेशम धागाकरण व करघा उद्योग भी इससे लाभान्वित हो रहे हैं।

राज्य में रेशम उद्योग के सुव्यवस्थित ढंग से प्रचार व प्रसार के लिए प्रशिक्षण की आवश्यकता को भली-भांति पहचाना गया

है। प्रत्येक वर्ष रेशम उत्पादन में प्रशिक्षण के लिए उद्यमियों के दल पश्चिम बंगाल के बहरमपुर स्थित अनुसंधान व प्रशिक्षण संस्थान में भेजे जा रहे हैं। जियावेक में स्थापित राज्य का रेशम उत्पादन प्रशिक्षण केन्द्र भी इस दिशा में प्रयासरत है।

वर्ष के अधिकांश माहों में रेशम उत्पादन के लिए अनुकूल मौसम ने भी उद्योग के विकास में पर्याप्त योगदान दिया है। राज्य सरकार ने इस दिशा में योजनाओं को लागू करने के अनेक प्रयास किए हैं। इनमें रेशमकीट बीज उत्पादन केन्द्र के लिए बीज उत्पादन प्रक्षेत्रों, सिंचाई सुविधायुक्त मैदानी इलाकों में पौधशालाओं, सामूहिक चाकी कीटपालन केन्द्रों के साथ-साथ सामूहिक धागाकरण केन्द्रों की स्थापना सम्मिलित हैं। खादी ग्रामोद्योग की आर्थिक सहायता के साथ "अम्बर चर्खा" लगाने का कार्यक्रम प्रारम्भ हो गया है।

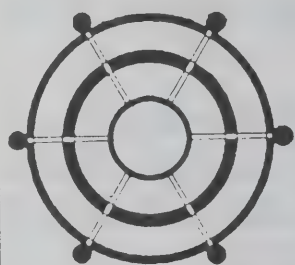
ओक तसर के लिए बाँस के जंगलों को सुरक्षित करके उन्हें एकरूपता प्रदान करना तथा मूगा रेशम के लिए सोम और सालू वृक्षों को वनों की कटाई से मुक्त रखने की योजना है। सड़क तथा खेतों के किनारे एरो पौधे स्वाभाविक रूप से उग आते हैं जिन्हें रेशम कीटपालन के लिए उपयोग में लाने का प्रयत्न किया जा रहा है। सरकार की योजनाओं तथा विकास के प्रयासों के परिपेक्ष्य में राज्य में रेशम उद्योग का उज्ज्वल भविष्य स्पष्ट दीख पड़ता है।

सत्यभान सारस्वत, केन्द्रीय रेशम उत्पादन अनुसंधान व प्रशिक्षण संस्थान, बहरमपुर (पश्चिम बंगाल)।

## स्वागत है

केन्द्रीय रेशम बोर्ड, राज्य रेशम उत्पादन विभागों एवं रेशम उत्पादन व उद्योग से संलग्न वैज्ञानिकों से अनुरोध है कि वे देश के रेशम उत्पादन की गुणवत्ता व परिमाण में सुधार लाने के लिए रेशम के खाद्य पौधों, रेशमकीट पालन, कोसा उत्पादन एवं कोसोत्तर प्रौद्योगिकी के विभिन्न क्षेत्रों में अपने उपयोगी प्रयोगों से सभी रेशमकर्मियों को अवगत कराएं। और, इसका सर्वश्रेष्ठ माध्यम है, इंडियन सिल्क पत्रिका।

प्रक्षेत्र स्तर पर कार्यरत कार्यकर्ता भी रेशम उत्पादन की विविध समस्याओं एवं उनके व्यावहारिक समाधान हेतु अपने विचार प्रस्तुत करें।



# Exports Review

Foreign exchange earnings of the Indian Silk Industry during April '97 amounted to Rs. 5635.91 lakh compared to Rs. 5773.90 lakh during April '96 and registered a marginal decrease of 2.4%.

Data on itemwise silkgoods certified for exports are given in Table - I.

Comparative data on region-wise silkgoods certified for exports are given in Table-II.

## Export of natural silkgoods

During April '97, the aggregate exports of natural silkgoods certified for exports amounted to 26.55 lakh sq. mtrs. valued at Rs. 5404.43 lakh as against 30.17 lakh sq. mtrs. valued at Rs. 5598.21 lakh during the corresponding month of the previous year and recorded a decrease of 12% and 3.5% both in quantity and value respectively.

## Exports of mulberry silkgoods

During April '97, mulberry silkgoods exports amounted to 25.66 lakh sq.mtrs valued at Rs. 5271.92 lakh as against 29.08 lakh sq. mtrs. valued at Rs. 5402.84 lakh during April '96 and showed a decrease of 11.8% and 2.4% in quantity and value respectively.

## Review of Silkgoods Certified for Exports

During April 1997

TABLE - I						
Export Performance of Indian Silk Industry						
(Unit : Lakh ; Qty : Silkgoods ; Sq. Mtrs. ; Silkyarn/Silkwaste : Kg ; Value : Rs.)						
Item of Export	April				% Increase	
	1997		1996			
	Qty.	Value	Qty.	Value	Qty.	Value
A. Silkgoods :						
(1) Mulberry						
(i) Dress Material	15.33	2759.06	13.11	2139.38	16.9	29.0
(ii) Readymade Garments	2.40	593.57	4.58	1036.67	-47.6	-42.7
(iii) Carpets	0.06	635.33	0.09	778.10	-33.3	-18.3
(iv) Sarees	1.84	376.17	2.96	519.92	-37.8	-27.6
(v) Scarves/Stoles	4.09	422.37	5.82	533.99	-29.7	-20.9
(vi) Others	1.94	485.42	2.52	394.78	-23.0	23.0
Mulberry Total [ i to vi]	25.66	5271.92	29.08	5402.84	-11.8	-2.4
(2) Tasar	0.89	132.51	1.09	195.37	-18.3	-32.2
Total [1+2]@	26.55	5404.43	30.17	5598.21	-12.0	-3.5
(3) Mixed/Blended	1.63	201.07	1.74	166.68	-6.3	20.6
Total [1+2+3]	28.18	5605.50	31.91	5764.89	-11.7	-2.8
B. SILKYARN	-	-	0.01	9.01		
C. SILKWASTE	0.18	30.41	-	-		
TOTAL [A+B+C]		5635.91		5773.90		-2.4
@ Refers to total natural silk goods exports.						

## Countrywise exports of mulberry silkgoods

Countrywise data of mulberry silkgoods certified for exports are given in Table III.

## Varietywise exports of mulberry silkgoods

During April '97 among the various varieties of mulberry silkgoods certified for



**Table - II**  
**Regionwise Silkgoods certified for exports**

[Unit:Lakh;Qty:Sq.mtrs;Value:Rs.]

Region	April					
	1997		1996		% Increase	
	Qty.	Value	Qty.	Value	Qty.	Value
West Europe	12.92	2580.32	14.95	2728.22	-13.6	-5.4
USA & Others	8.28	1936.22	9.89	1987.07	-16.3	-2.6
Asia	5.87	831.55	5.99	816.43	-2.0	1.9
Japan & Others	0.43	107.90	0.60	123.94	-28.3	-12.9
Africa	0.29	81.37	0.32	80.03	-9.4	1.7
East Europe	0.39	68.14	0.16	29.20	143.8	133.4
Total	28.18	5605.50	31.91	5764.89	-11.7	-2.8

exports, dress materials ranked first followed by carpets, readymade garments, scarves/stoles and sarees.

### Exports of tasar silkgoods

During April '97, tasar silkgoods exports amounted to 0.89 lakh sq.mtrs valued at Rs. 132.51 lakh compared with 1.09 lakh sq.mtrs valued at Rs. 195.37 lakh during April '96 and reflected a decrease of

**Table - III**  
**Foreign Exchange Earnings from Mulberry Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	April		% Increase
	1997	1996	
U.S.A.	1606.72	1604.83	0.1
Germany	749.57	896.19	-16.4
U. K.	672.50	625.04	7.6
France	334.79	286.50	16.9
U.A.E.	268.54	246.25	9.1
Canada	142.56	210.35	-32.2
Hong Kong	140.45	122.40	14.7
Netherlands	133.15	123.44	7.9
Italy	117.77	169.44	-30.5
Austria	82.77	69.30	19.4
Portugal	76.64	25.48	200.8
Switzerland	73.24	134.90	-45.7
Australia	67.27	60.21	11.7
Spain	66.76	53.39	25.0
Denmark	65.06	44.54	46.1
Brazil	62.44	11.14	460.5
Turkey	52.11	7.19	624.8
Belgium	50.60	86.26	-41.3
Singapore	48.18	91.78	-47.5
Thailand	44.69	9.98	347.8
Others	416.11	524.23	-20.6
Total	5271.92	5402.84	-2.4

@ Refers to top 20 importing countries

**Table - IV**  
**Foreign Exchange Earnings from Tasar Silkgoods Certified for Exports**

(Rs. in Lakh)

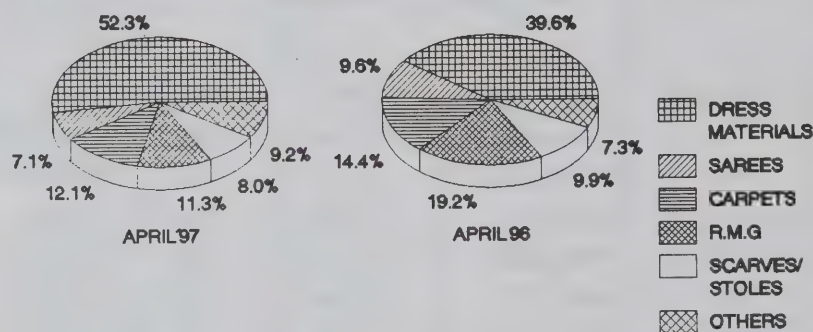
Country @	April		% Increase
	1997	1996	
Germany	27.94	36.99	-24.5
U.S.A	23.12	46.42	-50.2
U.A.E.	12.26	27.96	-56.2
Saudi Arabia	10.98	3.66	200.0
Turkey	10.88	0.90	1108.9
Chile	6.75	1.49	353.0
Hong Kong	6.25	-	-
Brazil	5.73	1.84	211.4
Belgium	5.22	0.10	5120.0
France	4.57	4.83	-5.4
U.K.	3.84	23.25	-83.5
South Africa	3.53	3.46	2.0
Switzerland	3.51	0.37	848.6
Japan	2.62	3.55	-26.2
Canada	2.18	7.11	-69.3
Argentina	1.32	-	-
Yugoslavia	0.73	2.02	-63.9
Israel	0.58	-	-
Spain	0.26	5.65	-95.4
Netherlands	0.17	0.35	-51.4
Others	0.07	25.42	-99.7
Total	132.51	195.37	-32.2

@ Refers to top 20 importing countries

**Table V**  
**Unit Export Price**  
(Rs. per Sq.mtr.)

Item	April		
	1997	1996	% increase
<b>A. Mulberry Silkgoods</b>			
1. Excl. Carpets	181.12	159.55	13.5
2. Incl. Carpets	205.45	185.80	10.6
3. Carpets	10588.83	8536.51	24.0
<b>B. Tasar Silkgoods</b>	148.89	179.42	-17.0

### *Share percentage of Varietywise Mulberry Silkgoods Export Earnings*



18.3% in quantity and 32.2% in value.

Countrywise data of tasar silkgoods certified for exports are given in Table -IV.

### **Unit export price**

The unit export price realised for mulberry and tasar silkgoods during April '97 and April '96 are given in Table - V.

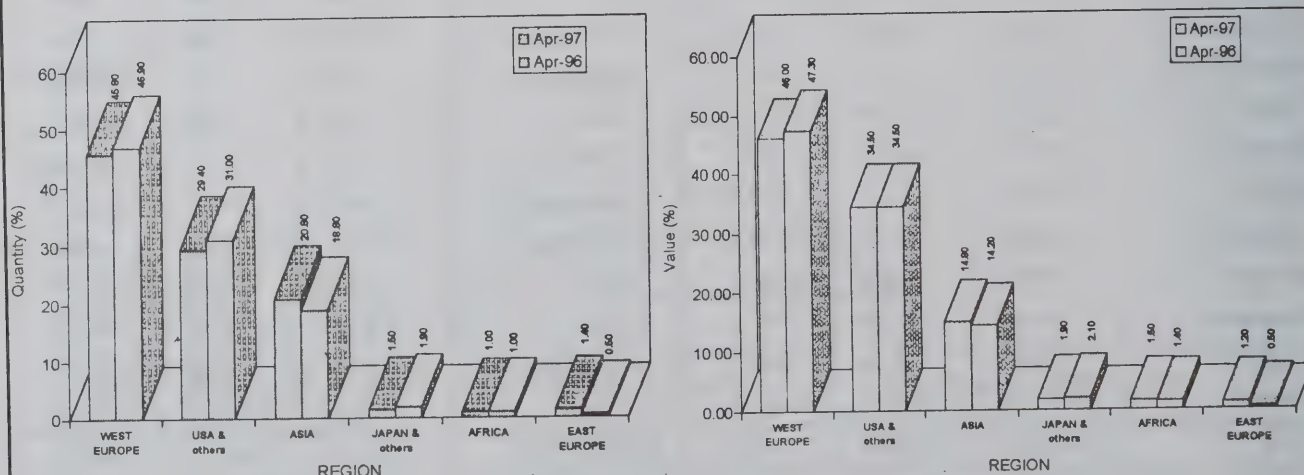
### **Export of mixed or blended silkgoods**

During April '97, mixed/ blended silkgoods exports amounted to 1.63 lakh sq.mtrs valued at Rs. 201.07 lakh compared with 1.74 lakh sq. mtrs. valued at Rs. 166.68 lakh during April '96 and though recorded a decrease of 6.3% in quantity however showed an increase of 20.6% in value.

### **Export of silkwaste and its by-products**

Silkwaste and its by-products certified for exports during April '97 amounted to 18 tons values at Rs. 30.41 lakh.

### **REGION-WISE SILKGOODS CERTIFIED FOR EXPORTS**





# Silk Prices

## April 1997

### Raw Silk : Volume of Transaction

At all the silk exchanges in Karnataka, a total quantity of 190.348 tons of all qualities of raw silk valued at Rs.1991.95 lakh was transacted during the period April '97 as against a quantity of 109.656 tons valued at Rs. 1145.16 lakh during April '96.

At Bangalore Silk Exchange alone, which is the largest exchange, a total quantity of 141.283 tons of all qualities of rawsilk viz. filature/ cottage basin, charka and dupion, valued at Rs. 1424.98 lakh was transacted during April '97 as compared to 86.261 tons valued at Rs. 873.53 lakh during April '96. The volume of transaction at Bangalore Silk Exchange alone accounted for 74.2% in quantity and 71.5% in value of the silk transacted at all the exchanges in Karnataka.

Data on qualitywise transaction of rawsilk at Bangalore silk exchange vis-a-vis at all the silk exchanges in Karnataka during April '97 and April '96 are given in Table-I. The transactions of rawsilk of different deniers of filature rawsilk at Bangalore Silk Exchange during April '97 is given in Table-II.

Transaction of raw silk of different deniers of Filature raw silk at Bangalore Silk Exchange during April '97

Denier		Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
				Min.	Max.	Avg.
13/15	Fine	83	106073	1270	1300	1286
14/16	Fine	2484	3167798	1200	1400	1276
16/18	Fine	5557	6972857	1110	1450	1255
18/20	Medium	6022	7536583	975	1500	1251
20/22	Medium	6721	8725923	750	1560	1298
22/24	Medium	867	1020736	1050	1375	1177
24/26	Medium	634	725213	1015	1250	1144
26/28	Coarse	623	712079	1100	1250	1143
28/30	Coarse	108	131162	535	1300	1212
30/32	Coarse	763	951559	1120	1420	1247

### Imported Silk (Varanasi Market)

(Rs./Kg)				
Filature Silk 20/22 Dr	April '97		April '96	
	Min	Max	Min	Max
Chinese	1400	1555	1240	1300
Korean	-	1400	1240	1300

### Prices of Indigenous Silk

(Rs./Kg)							
Silk Exchange	Variety	April '97			April '96		
		Min	Max	Avg	Min	Max	Avg
Bangalore Silk Exchange (Karnataka)	Filature/Cottage Basin	535	1560	1260	500	1435	1232
	Charka	600	1335	1046	500	1330	1052
	Dupion	201	940	658	390	802	653
Anna Silk Exchange, Kanchipuram Market (Tamil Nadu)	Filature/Cottage Basin	1055	1325	1069	1075	1240	1170
	Charka	900	1060	972	860	1110	974

## Mulberry Reeling Cocoon Prices

(Rs/kg.)

State	Market	Variety	April '97		April '96	
			Min	Max	Min	Max
Karnataka	Ramanagaram	Imp. cross breed	85.00	157.00	54.30	143.80
	T. Narasipur	Ord. cross breed	40.00	91.00	40.80	87.00
Tamil Nadu	Vaniyambadi	Imp. cross breed	45.00	128.60	60.00	134.00
	Coimbatore	Imp. cross breed	72.00	147.00	69.00	131.60
Andhra Pradesh	Hyderabad	Multivoltine	40.00	141.00	47.50	120.50
	Dharmavaram	Multivoltine	50.00	141.50	69.10	130.20

## Transaction of Raw Silk at Bangalore Silk Exchange

(Qty. : Tonnes, Value : Lakh Rs.)

Raw Silk Quality	April '97		April '96	
	Quantity	Value	Quantity	Value
Filature/Cottage Basin	23.869	300.645	15.614	192.376
	(51.914)*	(645.084)	(28.895)	(352.569)
Charka	90.563	947.743	54.990	578.838
	(111.363)	(1168.264)	(65.041)	(689.913)
Dupion	26.851	176.594	15.657	102.312
	(27.071)	(178.603)	(15.720)	(102.681)
Total	141.283	1424.982	86.261	873.526
	(190.348)	(1991.951)	(109.656)	(1145.163)

+ Figures in brackets refer to total transaction at all the Silk Exchanges in Karnataka.

## Prices of Sericultural Commodities

The prices of different qualities of indigenous rawsilk at Bangalore silk exchange (Karnataka) and Anna Silk Exchange (Tamilnadu) besides prices of imported rawsilk at Varanasi market, during April '97 in comparison with April '96 are given in Table - III.

Also the prices of different varieties of mulberry reeling cocoons quoted at important cocoon markets of Karnataka, Tamilnadu and Andhra Pradesh are given in Table IV.

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Our dynamic research and extension wings are engaged in the upliftment of the socio-economic conditions of the sericulturists of the country and are intensifying their efforts so that the generations of tomorrow may have a bright future

# HOPE IS HERE !



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**CENTRAL SILK BOARD**



# Change for the Better

**T**he quality of silk is closely associated with the quality of reeling. It is not just conversion of silk fibre into a thread, but a skillful art of giving a 'fine touch' to the royal fibre. The Indian silk reeling sector said to be the largest in the world, is as diversified as its size. Reeling is an independent activity with gainful employment in mulberry sector while is associated with the handloom weaving, in non-mulberry.

The fact that the renditta which was around 16.8 in 1960 has improved to 9.5 in 1995-96 is an indicator that the sector has all along kept pace with the improvements and pursued creativity amidst its tradition. Interestingly, one can find a number of indigenous devices and technologies developed by the rural artisans and adopted well for the local requirements. Yet, relatively speaking, one does feel that this sector has got less attention than due.

Today's fast changing market is demanding high quality silk in large quantities; but even today, about half the quantity of Indian silk is reeled on manually operated charkha while bulk of the rest is on power-driven cottage basin and a small quantity on filatures. Years of research, though, has contributed for the introduction of improved versions of charkha, cottage basin and semi automatic reeling devices which can assure

not only the quality, but also the productivity and better working atmosphere, the shift is rather slow. Of late, the Central Silk Board has introduced the multi-end reeling technology which enables the reeler to produce graded silk yarn from available cocoons. A reeler can produce 'A' grade silk from bivoltine and 'C' grade from multi bivoltine cocoons with this machine. This, coupled with new technologies for cocoon sorting, drying, stifling, improving reeling water etc. will certainly bring in much sought qualitative and quantitative changes in the reeling sector.

The silk reeling community too is aware of its short comings and is much receptive to the needs of the day. But, the problem lies in the fact that the sector needs high investment and the reelers are rural based and unorganised. Keeping this in view, the Government of India has recently sanctioned a scheme to enable the rapid adoption of the multi-end technology in the private sector. Under the scheme, eligible entrepreneurs will be extended with subsidy and credit facilities for establishment of multi-end reeling units, besides much needed training and technical support. This is also a potential area for the corporate sector to venture in. It's, in fact, high time for the reeling sector to welcome the 'change' for the better.

 **Editor**

This has reference to the article "Bivoltine Sericulture at Higher Altitude : Potentials" by Mahadevappa *et al.* (*Indian Silk*, April 1997).

The authors have rightly described the need to explore the possibilities of popularising the sericultural activities at higher altitude with temperate climate. There is no doubt that mulberry can be grown in temperate ecozones of hilly regions and the leaf quality in these areas is superior. The need of the hour is to evolve region and season specific technology as popularisation of uniform package of practices of tropical area is not going to find any place.

As the number of silkworm crops is restricted in these regions, sericulture here cannot be undertaken as a full time occupation. Any recommendation of maintaining systematic mulberry garden will never be adopted by the farmers of hilly regions mainly because of poor land holding vis a vis average rearing capacity (not more than 50 dfls per farmer). Under such circumstances, the small mulberry tree is the only alternative. Less than 100 such trees planted as per the farmers convenience will adequately serve their purpose.

The raw silk produced from cocoons of these regions is certainly going to meet the international standards. It is high time that the agencies involved should think of speedy exploitation of existing infrastructure and further extension in these regions.

**Dr. Rajnarain**  
Asst. Director

P2 Basic Seed Farm,  
Seeshambara, Jhajra,  
Dehradun, UP

## ADMISSION NOTICE

### M. Sc. in Sericultural Technology

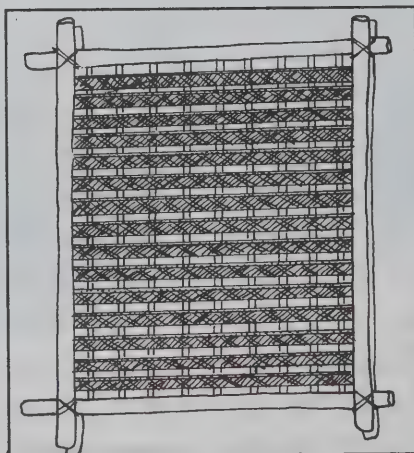
The Central Sericultural Research and Training Institute, Mysore, invites applications for two-year course in M. Sc. Sericultural Technology, commencing from August/September, 1997. The course is affiliated to the University of Mysore. The minimum qualification for admission is B. Sc. degree with any three optional subjects, viz., Zoology, Botany, Chemistry, Bio-chemistry, Microbiology, Agriculture, Sericulture, Bio-sciences and Bio-technology.

The total number of seats available is 20 (General-12, SC-2, ST-1, CSB and DOS sponsored candidates-5). The candidates have to appear for an entrance examination proposed to be held in Mysore, New Delhi and Calcutta during the first week of August, 1997.

Prescribed application form can be obtained from the Director, Central Sericultural Research and Training Institute, Srirampura, Manandavadi Road, Mysore-570 008. The request should accompany a crossed Demand Draft for Rs. 40 drawn in favour of the Director, Central Sericultural Research and Training Institute, Mysore-570 008 and a self addressed envelope (25 x 19 cm) affixed with postage of Rs. 5/-.

Duly completed application accompanied by a crossed Demand Draft for Rs. 60 should reach the addressee by 31st July, 1997.

## ERRATA



This refers to the letter 'Mountages-Why only spirals?' published in connection with the article "Temperature and Humidity Management during Cocoon Spinning" (*Indian Silk*, March '97). Here we give the figure of the hollow chandrike with bamboo strips arranged straight which is likely to hold comparatively more number of silkworms, as suggested in the letter.

— Editor



# Silkworm Breeding in India - An Overview

K. Thangavelu

**S**ericulture, though age-old and reference to the use of silk is evident from sacred literature like the Rigveda, the Ramayana and the Mahabharatha, not much is

---

***Silkworm breeding - the quintessence of sericulture - has traversed a long way ever since its systematic inception in India in the early part of this century. With the expansion of sericulture, the need for evolution of hybrids suitable to various agro-climatic conditions has assumed greater significance. The author traces the evolution of silkworm breeding in the country right from the inception.***

---

known about the indigenous silkworm races and their characteristics. There are only few indigenous silkworm races in the country. The surviving races are all multivoltine, whereas the univoltine races are almost extinct. The three

popular multivoltine silkworm races viz. C.Nichi, Nistari and Pure Mysore were also introduced from China (Table-1). Systematic breeding of silkworm started only during early part of this century. Prior to 1922, only pure races were reared and subsequently exploitation of hybrids became popular. Pure Mysore x C.Nichi was probably the first hybrid in Karnataka. The exploitation of hybrids in West Bengal and Jammu & Kashmir came much later during 1956 and 1959, respectively.

Traditionally, sericulture was confined to Kashmir and Uttar Pradesh in north, West Bengal and Assam in east; Karnataka, Andhra Pradesh and Tamil Nadu in south. Of late, sericulture has been introduced in almost all the states and hence, there is an immediate need for productive silkworm races to suit different agro-climatic conditions and seasons.

## Historical Review

### Progress of multivoltine silkworm breeding

**Hybridization & Selection :** Systematic attempt at silkworm breeding began during early 1940s by C.C. Ghosh, who evolved multivoltine races - Nistid and Nismo by hybridizing multivoltine races - Nistari and Chotapolu-with Italian bivoltine races. Later, D.C. Sarkar evolved multivoltine races Ichat and Itan. These new races were

popular with farmers, performed well in the field conditions and exhibited higher yield of cocoons than the indigenous ones. However, due to improper maintenance of breeders stock and poor selection procedures, these four races degenerated and got extinct.

Later in the 1950s, the Sericulture Department of Karnataka evolved HS-6 by crossing Iranian white with C.Nichi. This race though initially exhibited bivoltine characters, later developed multivoltine characters. During early 60s, multivoltine races viz. Kolar gold, Mysore princess and Kollegal jawan were evolved at Central Sericultural Research & Training Institute (CSR&TI), Mysore. In CSR&TI, Berhampore, MBD-IV, NBD-V, O, L, G, D3C, D 14b, A18 etc. were evolved in the 1960s and 70s. In 1975, the Sericulture Department of Tamil Nadu evolved another multivoltine race viz. Tamil Nadu white through hybridization and selection from PM x C. Nichi.

During 1985-90, CSR&TI, Berhampore evolved A-23, A-25, OS-61, OS-68 and OS-616; all multivoltine races. Some more multivoltine races viz. TEP-2, AW8(a), C<sub>1</sub>, C<sub>5</sub>, H, G, Hosa Mysore and NS4 were evolved in the 1970s by CSR&TI, Mysore followed by MY<sub>1</sub>, MY<sub>2</sub>, P<sub>2</sub>D<sub>1</sub> and RD<sub>1</sub> in the eighties. Improvement in multivoltine cocoon characters viz. cocoon wt. 1.249 g; shell wt. 0.199 g; shell ratio 15%, filament



**Fig. 1. Popular Multivoltine Races**  
**A - Nistari, B -Tamil Nadu White, C - Pure Mysore, D - G**

**Table 1. Indigenous and naturalised Silkworm races**

Race	Voltinism	Region	Cocoon characters
<i>Barapolu</i>	Univoltine	Assam	Greenish white flossy cocoon, one end pointed with short filament length
<i>Kashmiri race</i> (Extinct)	-do-	Kashmir	White or yellow elongated oval cocoon
Nistari	Multivoltine	Bengal (Introduced 1780-1781 from China)	Golden yellow, soft, flossy cocoon spindle type
<i>Chotapolu</i> (Extinct)	-do-	Assam	Yellowish or creamish white, small flossy cocoon
Pure Mysore	-do-	Karnataka (Introduced from China in 1875)	Creamish yellow flossy, soft cocoon with one end pointed
<i>Bulupolu</i> (Extinct)	-do-	Bengal	Yellow to greenish white, flossy cocoon
<i>Naya polu</i> (Extinct)	-do-	Assam	Light yellow to flossy cocoon with short filament length
<i>Sorupat</i> shaped cocoon	-do-	-do-	Light creamy, small, flossy spindle
<i>Moria white</i>	-do-	-do-	Creamy white, spindle shaped small flossy coon
<i>C. Nichi</i>	Originally Bivoltine Presently Multivoltine	Karnataka (Introduced during early 20th century)	White dumb bell shaped cocoon
HS-6	Multivoltine	Karnataka	White dumb bell shaped cocoon
Jam races	Bivoltine	Kashmir	White oval/constricted.

length of 550 mtr. and raw silk yield of 7.5% were achieved in the 80s compared to 300 mtr. silk filament length, 0.1% shell wt. and 1.09 g. cocoon wt. of old indigenous Indian races. Similarly, CSR&TI, Berhampore evolved several multivoltine breeds viz. A4e, MBDIV, D<sub>146</sub>, D<sub>30</sub> etc. However, most of the multivoltine races evolved were not successful at field level because of recurrent occurrence of hibernated eggs.

Recently, ten multivoltine races MU and MG series have been evolved in the University of Mysore, Karnataka, through conventional breeding (hybridization and selection) and some of these races exhibit 1.495 to 1.593 g. cocoon wt., 16.3 to 17.98% shell ratio, 90% and above Effective Rate of Rearing (ERR) and 90 to 92% pupation rate.

**Mutation Breeding :** Through irradiation and chemical mutagen, CSR&TI, Berhampore evolved CB-2, CB-5 in the year 1981. Similarly CSR&TI, Mysore evolved PM X -through X- radiation during



the same period. MU<sub>1</sub> and MU<sub>303</sub> were evolved through mutation breeding in the University of Mysore during 1979-1982. These races have 1.20 to 1.26 g cocoon wt., 16% shell ratio and ERR of above 90%.

**Line Breeding :** During 1986-89, LMP, DMR, LMR, LMO and PO races were isolated through line breeding by crossing female with larval marking and male without crescent marking of Nistari race.

**Breeding multivoltine races with sex limited character:** In late 60s, some multivoltine races with sex linked larval markings were synthesized viz. Nistari (SL), D14b (SL) at CSR&TI, Berhampore and MBD-IV (SL) and AP1 (SL) at CSR&TI, Mysore during the 60s and 70s, respectively.

### Progress of Bivoltine Silkworm Breeding

**Hybridization and selection :** Except Barapolu, there is no other bivoltine indigenous race and hence most of the bivoltine races used are either exotic or evolved through

hybridization. Before 70s, the popular bivoltine exotic races viz. C-110, C-108, C-122 (Oval) and J<sub>112</sub>, J<sub>122</sub>, C.Nichi (dumb bell) were exploited. In the early 70s, KA and KB races were evolved at Regional Sericultural Research Station (RSRS), Kalimpong and subsequently, NB<sub>18</sub>, NB<sub>4D<sub>2</sub></sub>, NB<sub>7</sub>, NB1C were evolved at CSR&TI, Mysore.

In the early 80s, six Chinese type (oval) and six Japanese type (dumb bell) races were evolved, out of which CA<sub>2</sub> and CC<sub>1</sub> (oval) and JC<sub>1</sub>, JA2 and JB<sub>2</sub> (dumb bell) were selected as promising races. During the same period, a hardy bivoltine race PCN was isolated for rainfed sericulture zone in Karnataka. During the mid 70s four bivoltine races viz. SS<sub>17</sub>, PLF, KY<sub>1</sub>, P<sub>5</sub> (dumb bell) were evolved at RSRS, Pampore. RSRS, Majra evolved three bivoltine races of oval viz. SF-19, YS-3 and YS-5. Mysore University initiated bivoltine silkworm breeding during 1984 and till now, the centre has evolved nearly 24 races and 9 lines (MU & MG series).

**Breeding of Bivoltine races with sex-limited characters :** In the 80s, bivoltine races with sex linked characters viz. CC<sub>1</sub> and NB<sub>4D<sub>2</sub></sub> were evolved at CSR&TI, Mysore. The body colour of the female and male larvae is yellow and white, respectively and spin yellow and white cocoons according to the body colour. In the silkworm germplasm collection of CSR&TI, Mysore, there are more than 25 sex limited races. However, sex limited races are not yet popular in India.

In the silkworm seed production programmes, sex limited races will be more beneficial and save considerable cocoons for silk reeling. In Japan, nearly 40% of silkworm seeds is produced using sex limited races. Similarly, if India adopts this strategy and use sex limited races with larval marking for silkworm egg production of multi x bivoltine, there are possibilities to save half the quantity of each parent seed cocoons for production of raw silk. Also, seed quality will improve considerably by avoiding selfing.



Fig. 2. Popular Bivoltine Races in South India  
A- NB<sub>4D<sub>2</sub></sub>, B -NB<sub>7</sub>, C- NB<sub>18</sub>, D-KA

**Table 2. Multivoltine races evolved and cocoon characteristics**

Race	Cocoon characteristics
<b>KARNATAKA</b>	
Kolar gold	White oval
Mysore Princess	-do-
Kollegal jawan	-do-
TEP-2	-do-
AW8(a)	-do-
C <sub>1</sub>	White dumb bell
C <sub>5</sub>	-do-
H	-do-
G	-do-
Hosa Mysore	Dark yellow, oval
NS-4	-do-
MY-1	-do-
MY-2	-do-
P <sub>2</sub> D <sub>1</sub>	
RD <sub>1</sub>	
PMX	Greenish yellow, spindle
AP <sub>1</sub> (SL)	Greenish yellow, elongated oval
Mu <sub>1</sub>	Oval, light green cocoon
Mu <sub>11</sub>	-do-
Mu <sub>15</sub>	-do-
Mu <sub>22</sub>	-do-
Mu <sub>23</sub>	-do-
Mu <sub>25</sub>	-do-
Mu <sub>303</sub>	-do-
Mu <sub>508</sub>	-do-
Mu <sub>509</sub>	White, oval
Mu <sub>519</sub>	Green, oval
Mu <sub>520</sub>	White, oval
Mu <sub>953</sub>	White, dumb bell
<b>TAMIL NADU</b>	
Tamil Nadu White	White, spindle
<b>WEST BENGAL</b>	
Nismo	White or yellow oval
Ichot	Yellow or white, spindle shape
Itan	Yellow, spindle
A4e	Yellow, oval
MBD-IV	Golden yellow, dumb bell
MBD-V	-do-
O	-do-
L	Golden Yellow, oval
G	
D3C	
D14b	
A18	
A-23	Golden yellow, oval
A-25	-do-
OS-61	-do-
OS-68	-do-
OS-616	-do-
CB-2	Golden yellow
CB-5	-do-
Nistari (SL)	Dumb bell
D14b (SL)	Golden yellow, spindle, oval
MBD-IV (SL)	Dumb bell

**Table 3. Bivoltine races evolved and cocoon characteristics**

Race	Cocoon characteristics
<b>KARNATAKA</b>	
NB <sub>18</sub>	White, dumb bell
NB <sub>4</sub> D <sub>2</sub>	-do-
NB <sub>7</sub>	White, oval
NB1C	-do-
CA <sub>2</sub>	-do-
CC <sub>1</sub>	-do-
JC <sub>1</sub>	-do-
JA <sub>2</sub>	White, dumb bell
JB <sub>2</sub>	-do-
PCN	Dark greenish, yellow, flossy, spindle
CC <sub>1</sub> (SL)	White, oval
NB <sub>4</sub> D <sub>2</sub> (SL)	White, dumb bell
Mu-281	White, constricted
Mu-285	White, oval
Mu-286	White, constricted
Mu-287	White, oval
Mu-297	-do-
Mu-404	-do-
Mu-488	White, dumb bell
Mu-499	White, slight constricted
Mu-807	White, dumb bell
MG-511	White, oval
MG-512	White, dumb bell
MG-521	White, oval
MG-522	White, dumb bell
MG-580	-do-
Mu-716	White, oval
Mu-718	White, dumb bell
Mu-720	-do-
Mu-723	White, oval
Mu-756	White, dumb bell
Mu-809	-do-
Mu-912	-do-
Mu-927	Light yellow, dumb bell
Mu-929	White, dumb bell
Mu-935	-do-
<b>KASHMIR</b>	
SS-17	White, dumb bell
PLF	-do-
KY <sub>1</sub>	-do-
P <sub>5</sub>	-do-
<b>UTTAR PRADESH</b>	
SF-19	White, oval
YS-3	-do-
YS-5	-do-
<b>West Bengal</b>	
KA	White, oval
KB	-do-
Besides Bivoltines, Mu851, 853, 854, 858, MG405, 406, 414 and 408 have been also recently evolved at the university of Mysore, Karnataka	

## Research institutions

Till recently, most of the silk-worm breeding was carried out at

CSR&TI, Berhampore (West Bengal) and Mysore (Karnataka). Limited works were carried out in the

Departments of Sericulture in Karnataka and Tamil Nadu, RSRS, Kalimpong (West Bengal),





**Fig. 3. Popular Bivoltine Races in Jammu & Kashmir**  
A- PAM-102, B -PAM-107, C- Jam-2, D-Jam-11

Pampore (Jammu & Kashmir) and Majra (Uttar Pradesh). Of late, University of Mysore, Karnataka State Sericultural Research and Development Institute (KSSRDI), Bangalore, University of Agricultural Sciences, Bangalore, Tamil Nadu Agriculture University, Coimbatore, Madurai Kamaraj University, Madurai and Indian Institute of Science, Bangalore have initiated silkworm breeding with different objectives.

#### Recent trends

During later part of 1980s, KSSR&DI, Bangalore evolved a few bivoltine races (NP and SP) under the guidance of Japanese silkworm breeders. Hybrids of these new races with KA (NP x KA; SP x KA) were tested in the field. These hybrids are promising with 1.52 to 1.54 g cocoon wt. and 20.4 to 20.8% silk ratio. Silkworm breeding programmes were further intensified with technical and financial support from Japan International Cooperation Agency (JICA) at CSR&TI, Mysore. As a result, some promising bivoltine races

(CSR 2,4, 5, 6 etc.) have been evolved. These races are under multi-locational field trial under All India Co-ordinated Experiments. Also, a sizeable quantity of silkworm eggs of these new hybrids has been supplied to selected farmers since 1995.

The field level results are



**Fig. 4. Popular Bivoltine Races in North India**  
A- YS, B -SF-19, C- SH-6

encouraging and interesting. The cocoon yield level range from 20 to 56 kg/100 dfl at farmers level. The cocoon wt (1.7 to 2.0 g), shell wt (0.35 to 0.42 g) and silk ratio (20 to 23%) are much higher than the existing bivoltine races. Similarly, multivoltine races (1HT, 2HT, B<sub>71</sub> and A<sub>61</sub>) tolerant to high temperature have been evolved. Besides, some more multivoltine races (BL series) have also been evolved. These races and their hybrids are at various stages of field trial and evaluation.

Indian Institute of Science, Bangalore has attempted to develop transgenic silkworm with introduced gene from foreign donor. Similar attempt to produce transgenic silkworm was earlier made in France by a team of scientists from different countries. Madurai Kamaraj University, Madurai has attempted to fuse two nuclei from different silkworms in one egg with a view to develop polyploids in silkworm which appears to be a new concept in the silkworm breeding.

There is another biotechnologi-

**Table 4. Pedigree and economic characters of popular bivoltine races**

Race	Parents	No. of eggs/ laying	Survival	Cocoon Wt. (g)	Shell Wt.(g)	Shell Ratio (%)	Filament length (m)	Neatness (%)
NB <sub>7</sub>	Kinshu x Showa	475-575	80-90	1.45-1.80	0.32-0.40	21-22	950-1000	85-90
NB <sub>18</sub>	(Kokko x Seihaku) x (N <sub>124</sub> x C <sub>124</sub> )	475-575	80-90	1.5-1.85	0.35-0.42	22-23	950-1000	85-90
NB <sub>4</sub> D <sub>2</sub>	(Kokko x Seihaku) x (N <sub>124</sub> x C <sub>124</sub> )	475-600	90-95	1.55-1.90	0.30-0.40	20-21	900-950	85-90
KA	(N <sub>122</sub> x C <sub>110</sub> ) x (N <sub>124</sub> x C <sub>124</sub> )	470-650	85-90	1.70-1.90	0.23-0.30	16-18	900-1000	85-90
CC <sub>1</sub>	(KA x NB <sub>1</sub> ) x (NB <sub>7</sub> x SPC <sub>1</sub> )	500-650	90-95	1.70-2.00	0.34-0.41	20-21	900-1050	85-90
CA2	(NB <sub>7</sub> x SPC <sub>2</sub> )	480-600	85-90	1.6-1.9	0.32-0.40	20-21	900-1000	85-90

cal approach to silkworm breeding involving DNA finger printing and induced anti-bacterial protein. Induction of amylase gene from multivoltine race to bivoltine race to study the hardiness of the race has opened new dimensions to silkworm breeding. DNA finger printing using banded krait minor satellite DNA derived probe has the potential use for marker-assisted breeding and varietal identification. Infection of live *Escherichia coli* into larvae of silkworm induces antibacterial activity in the haemolymph. These recent trends are at various levels of laboratory testing and have opened new vistas in silkworm breeding.

### Analysis

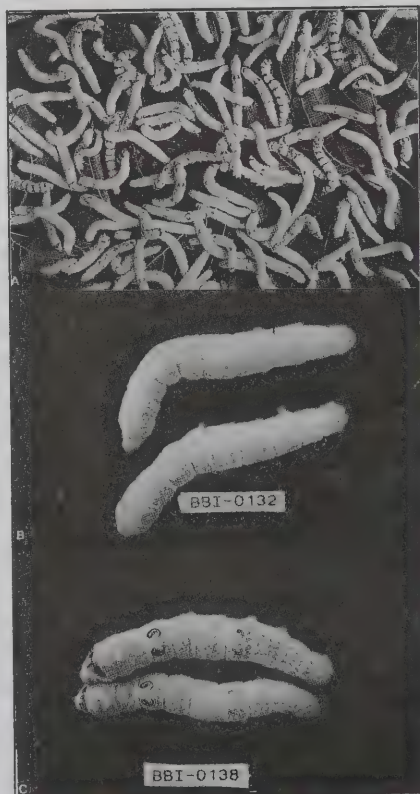
There are 52 multivoltine (Table-2) and 45 bivoltine (Table-3) races evolved in India, but hardly three multivoltine races (MY<sub>1</sub>, G and Tamil Nadu white) are exploited for commercial silk production in a limited scale; And, hardly 5 bivoltine races (KA, NB<sub>4</sub>D<sub>2</sub>, NB<sub>7</sub>, NB<sub>18</sub> and PCN) are exploited. Recently, CC<sub>1</sub> and CA<sub>2</sub> have been introduced in the field in a very limited quantity as an exploration trial. This indicates that

only 7.1% of multi and 11.1% of bivoltine races are exploited in the field. An estimate indicates two multivoltine races, Pure Mysore and Nistari contribute more than 90% of the multivoltine component and 80% of the bivoltine

component is attributed to NB<sub>4</sub>D<sub>2</sub>, NB<sub>18</sub> and KA. The causes for the non-exploitation are:

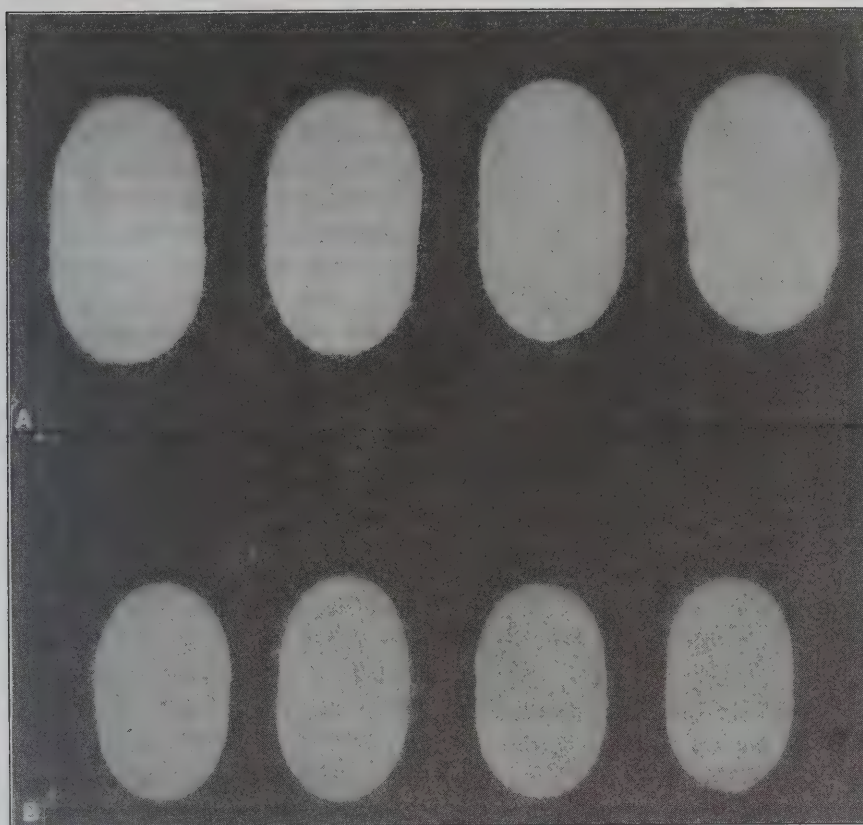
**Delay in race release :** Some of the races (recently evolved) have not been authorised for field release. In India, the pre-requisite for race release calls for extensive data on qualitative and quantitative characters with reeling details of the race(s) and hybrids with multi locational trials and performance in the farmers fields. In Japan, only the hybrids are tested in selected research stations and the results are submitted to a committee for authorisation. At a later stage, adaptability of the hybrid to the local climate is tested by the implementing agency. To overcome such obstacle, Central Silk Board has recently introduced a simple procedure for authorisation of silkworm races and pre-release trial of silkworm races/hybrids have been initiated through All India Co-ordinated Experiments in several test centres representing various agro-climatic zones. It is likely that silkworm race release will be faster and effective in future.

**Low genetic variability among the bivoltine races and common pedigree :** The pedigree of the



**Fig. 5. Genetic Divergence**  
A- Zebra-SL (Sex limited race),  
B -BBI-0132 (Plain larvae),  
C- BBI-0138 (marked larvae)





**Fig. 6. Some New Bivoltine Races**  
A- CC<sub>1</sub>, B -CA<sub>2</sub>, C-KPG<sub>2</sub>, D-KPG<sub>7</sub>, E-KPG-B, F-KS-oval

common bivoltine races in vogue (Table-4) indicates that the gene pool has been contributed only from few exotic races and there is no high degree of variation. For instance, NB<sub>4</sub>D<sub>2</sub> x KA is one of the popular bivoltine hybrids and one of their pedigrees (N<sub>124</sub> x C<sub>124</sub>) is common to both the races; hence, it is not possible to achieve high degree of heterosis from the above combination. High degree of heterosis over mid parent value will be expected only from a cross of genetically distant parents with wide variation.

A careful perusal of the pedigree of multivoltine and bivoltine races evolved indicate that NB<sub>4</sub>D<sub>2</sub>, KA, NB<sub>7</sub>, J<sub>111</sub>, J<sub>112</sub>, DAIZO among the popular bivoltine races, PM and C.Nichi among the multivoltine races have served as the parental stock in many breeding programmes for evolution of races/lines. Single cross, three way cross,

double cross, back cross and out cross were employed as breeding plans. The parental hybrid N<sub>124</sub> x C<sub>124</sub> has been used in the evolution of NB<sub>4</sub>D<sub>2</sub>, NB<sub>18</sub> and KA; whereas NB<sub>7</sub> is the common parent of CC<sub>1</sub> and CA<sub>2</sub>. Similarly, all the 24 bivoltine races evolved by the Mysore University have more than one of the existing popular bivoltine races as a parent race. This method of silkworm breeding through inbreeding of known popu-

lar races perhaps leads to narrow range of genetic variability, accumulation of lethal gene and loss of heterosis.

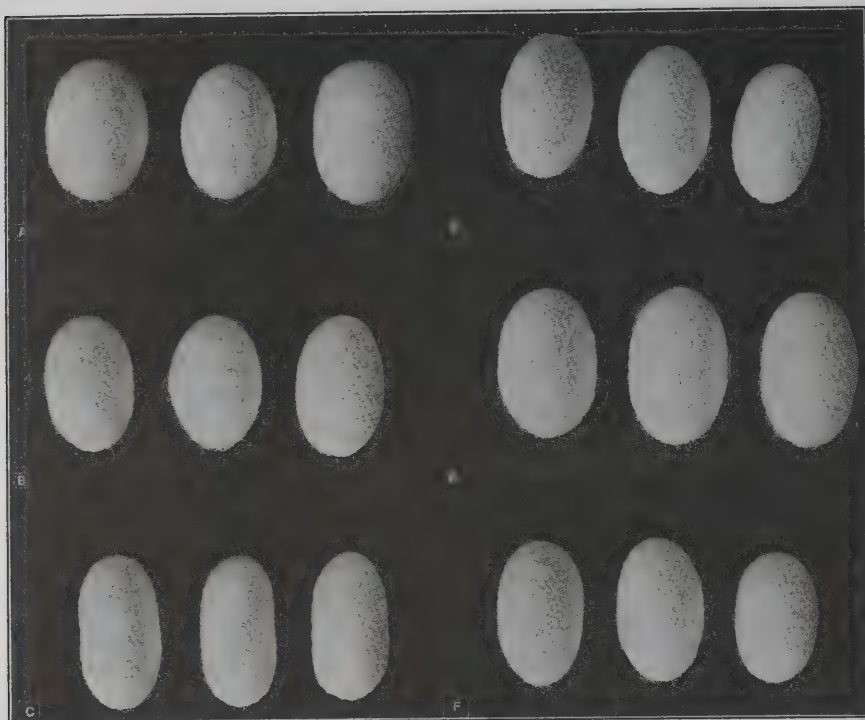
**Use of bivoltine to evolve multivoltine races :** Two of the popular multivoltine races viz., HS6 and C.Nichi were earlier exhibiting bivoltine character, but due to continuous selection and exploitation have become acclimatised to tropical condition with multivoltine character. While Ichat and Itan have Italian bivoltine races as one of their parent races, the other multivoltine races have DAIZO or some other popular Indian bivoltine breeds. Thus, the evolved multivoltine races have already inherited some of the genes from bivoltine races and will not exhibit high degree of heterosis if crossed with the same bivoltine parent for cross breed.

**Multivoltine races with diapause character :** Some of the evolved multivoltine races viz. Hosa Mysore, MY<sub>1</sub>, RD<sub>1</sub>, etc. exhibit diapause character in the egg stage even in summer season under the tropical conditions, as these races were evolved from bivoltine breeds. This is infact not a desirable character in multivoltine races.

**Un-popularity of sex-limited character :** Though 90% of the Indian silk comes from a cross breed of multivoltine female with bivoltine male, the farmers are not acquainted with rearing of

**Table 5. Economic Characters Some of Popular Multivoltine races**

Race	No. of eggs/ laying	Cocoon Wt. (g)	Shell Wt.(g)	Shell Ratioo (%)	Filament length (m)
Pure Mysore	300-350	0.80-1.00	0.10-0.14	12	280-300
Nistari	400-440	1.00-1.10	0.1- 0.14	12-13	340-380
Daizo	340-400	0.90-1.10	0.12-0.15	11-14	300-380
C.Nichi	300-350	0.80-0.90	0.11-0.20	12-14	350-400
Moria white	300-400	0.80-0.90	0.11-0.20	12-14	350-400
Sarupat	350-400	0.90-1.10	0.11-0.20	12-14	350-400



**Fig. 7. Promising bivoltines-CSR series**  
A-CSR<sub>2</sub> x CSR<sub>4</sub>, B-CSR-2 X CSR<sub>5</sub>

sex limited races. In the cross breed silkworm seed preparation, multivoltine female and bivoltine male serve as the parent seed stocks and hence, the multivoltine male and bivoltine female cocoons are wasted; yet the farmers have not accepted the sex limited races.

**Low genetic variability among the multivoltine races :** The popular multivoltine races do not exhibit high degree of genetic variability for quantitative characters (Table-5).

**Breeding methods :** Even though there are three common breeding methods *viz.* line, cross and mutation breedings, most of the silkworm breeders employ cross breeding as a tool.

## Strategies

The quality of silkworm races is by far the most important element of sericulture technology and much efforts should be devoted to breeding better races. In Japan, a variety of silkworm races were

bred for different specific purposes, consequently many good quality races, some of them having a cocoon wt. of 2.9 g, a cocoon shell wt. of 0.6 g, raw silk of 21% were evolved. Similarly, healthy and easy to rear silkworm races, races suited to the production of small or large size fibre and polyphagous races feeding on low cost artificial diet were bred to meet diversified requirements. Silkworm races are evolved for higher fecundity, healthy and robust larvae, increased cocoon yield, quality silk filament etc. But, some of these characters have negative correlation and hence, difficult to evolve a race with all desired characters.

Egg productivity has negative correlation with cocoon shell and raw silk percentage whereas size of cocoon filament has negative correlation with length of cocoon filament, while it has positive correlation with cocoon weight. For the improvement of cocoon productivity, size of cocoon filament is one of the barriers. Quantitative

characters and larval duration exhibit negative correlation. Some of the qualitative characteristics like neatness of silk filament is controlled by single gene (*ne*) and the high grade (a few small slubs) is inherited as dominant. Therefore, neatness shows high heritability whereas reelability is controlled by polygenes and their expression greatly depend upon environmental factors *viz.* temperature, humidity and air current during cocoon spinning. They have low heritability, hence, most difficult character in the breeding of silkworm races. Similarly cocoon yielding is related to more than one character *viz.* pupation ratio, cocoon weight, shell weight, shell ratio, reelability, size of cocoon filament and raw silk percentage. Therefore, it is not easy to improve the cocoon yield without reducing the values of other correlated characters.

Most of the silkworm breeding programmes aim at evolving a superior race for quantitative and qualitative characters, which is rather difficult as some of the characters have negative correlation and some have low heritability. Efforts are being made to evolve silkworm races with specific objectives. Several characters *viz.* egg productivity, healthiness of larvae, cocoon yield, quality of silk filament are mainly done by mass selection (bulk method), whereas for improvement of some other characters *viz.* cocoon shape, cocoon weight, cocoon shell weight, cocoon shell percentage and silk filament length, it is necessary to apply individual selection.

Thus, the two selection methods are different and need application at different stages or programmes which is not the case in most of the silkworm breeding



programmes in India. There are two distinct strategies in silkworm breeding *viz.*,

- \* Establishment of inbred lines by selection of quantitative and qualitative characters at successive generation, and
- \* Selection of suitable F1 hybrids which has excellent combination.

These two objectives can be achieved only when widely varied and distinctly different gene pool are created in the parent silkworm races, so that high degree of heterosis will be exhibited in the F<sub>1</sub> hybrid. Most of the multivoltine and bivoltine races have very narrow range of gene pool from few races and hence, seldom exhibit heterosis of any significance. Popular cross breed (multi x bi or bi x multi) exhibit high degree of heterosis because of widely different pedigree with distinct genotypes. Hence attempts should be made to use different silkworm races with desirable genetic traits and evolve races for specific requirements. Many such inbred lines showing different characteristics and new gene combination are necessary to evolve silkworm races for specific objectives.

Detailed and in depth studies of genetic traits controlled by polygenes, single gene, marker genes, modifiers, additive characters, linkage groups, race specific biochemical markers, gene mapping, mosaic genes pertaining to Indian silkworm races are essential to achieve better success in the breeding programmes.

Innovative approaches adopted in crop and animal breeding are not extensively followed in silkworm breeding. For instance, application of genetic tools *viz.* biometrical statistics, population genetics, biochemical genetics and genetic engineering could find better place in silkworm breeding programmes. Apart from the popular cross breeding and line breeding methods, new approach like population genetics involving reciprocal recurrent selection or modified recurrent reciprocal selection for hybrid vigour may be more rewarding. Of late, there is a new trend in silkworm breeding programmes like creation of transgenic silkworm and polyploids through bio-technology.

#### Challenges and Prospects

While silkworm breeders

in India are aiming to improve overall productivity of silk per unit area of mulberry plantation and quality of silk, the breeders do not address themselves to some of the pertinent and unique problems prevailing in India *viz.* high temperature in the tropics, poor quality mulberry leaves, overcrowding in silkworm rearing bed, unhygienic conditions in the silkworm rearing environment, wide fluctuation in temperature and humidity during rearing period and heavy pathogen load in the micro-environment.

Unless these specific problems are suitably addressed in the silkworm breeding programmes, any elite silkworm race with high quality silk traits will not meet with success in general. Such races may be successful only in few specific sericultural tracts. Otherwise, overall improvement in the silkworm rearing practices by the average farmer should be improved to ensure successful rearing of high quality silkworm races evolved.

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*The author is the Director, Silkworm & Mulberry Germplasm Station, Hosur, Tamil Nadu.*

## Indian Silk goes vernacular !!!

A heartening news for the lovers of vernacular ! Your favourite '**Indian Silk**' goes vernacular with its quarterly publication in Bengali, Hindi, Kannada, Tamil and Telugu, in our endeavour to make it much more useful to the sericulturists and the silkmen. An easy way to keep abreast of the 'latest' in the sericulture and silk industry, both national and international, in your own language. For details/copies, write to the Editor.

# Mulberry Diseases : Prevention is better than control

Tomy Philip

**T**hough frequent leaf harvest and periodical pruning restrict the multiplication of pathogens on mulberry, yet there is a considerable damage due to diseases. One of the main factors for repeated occurrence of diseases on mulberry is the ready availability of inoculum in the garden. Diseased

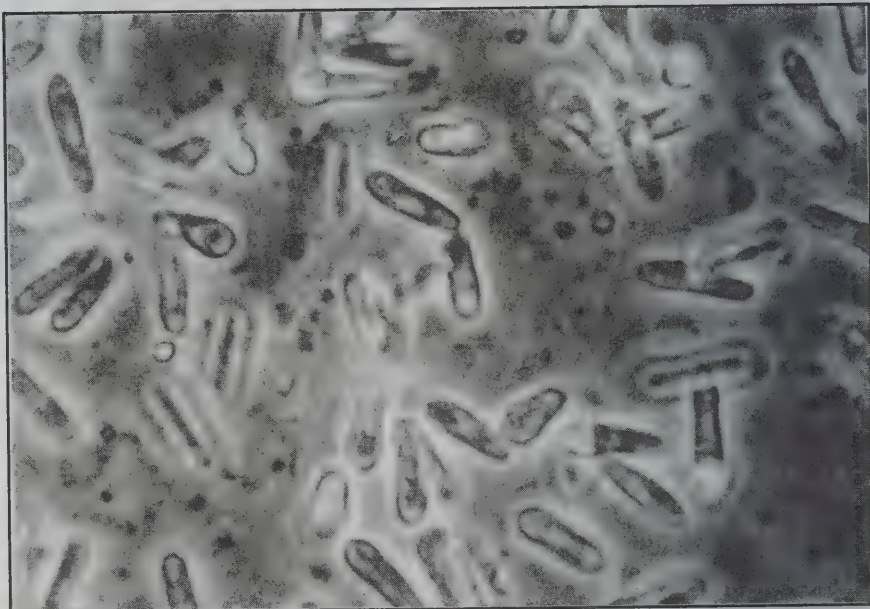
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***A healthy mulberry garden is a must for a successful silk-worm crop. Prevention of inoculum in the mulberry garden is always better than control of the diseases later, says the author and offers tips for steps to be adopted in advance to harvest a bumper leaf yield.***

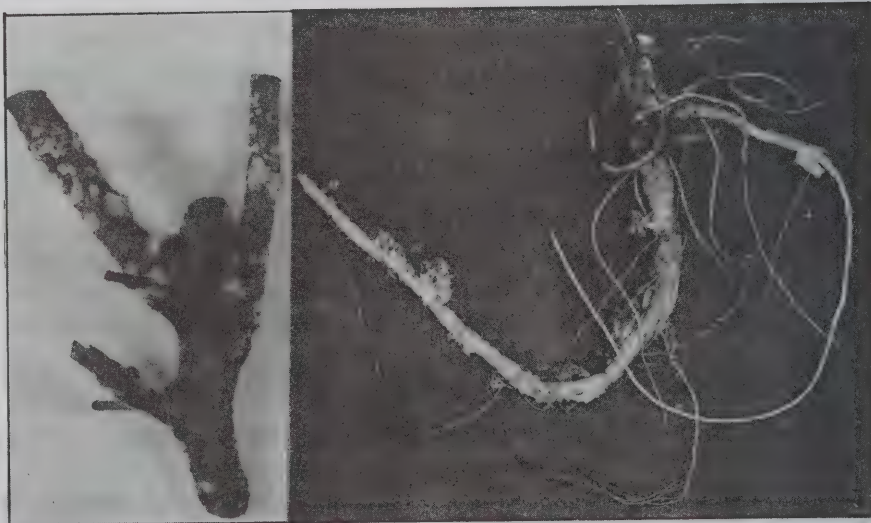
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leaves and branches of the previous crop left callously in the garden act as sources of inoculum for the ensuing season. As soon as the environment becomes congenial, these inoculum germinate and attack healthy plants causing diseases.

Diseases always reduce the leaf yield and quality, thus affecting the silkworm rearing. Leaf yield will be reduced by the premature defoliation due to diseases and by way of reducing the total consum-



***Presence of inoculum in the garden leads to disease occurrence***



***Diseased plant parts and dead plants are sources of inoculum***

able area in those leaves which do not defoliate, but are diseased. Similarly, diseases also reduce the protein and moisture content in

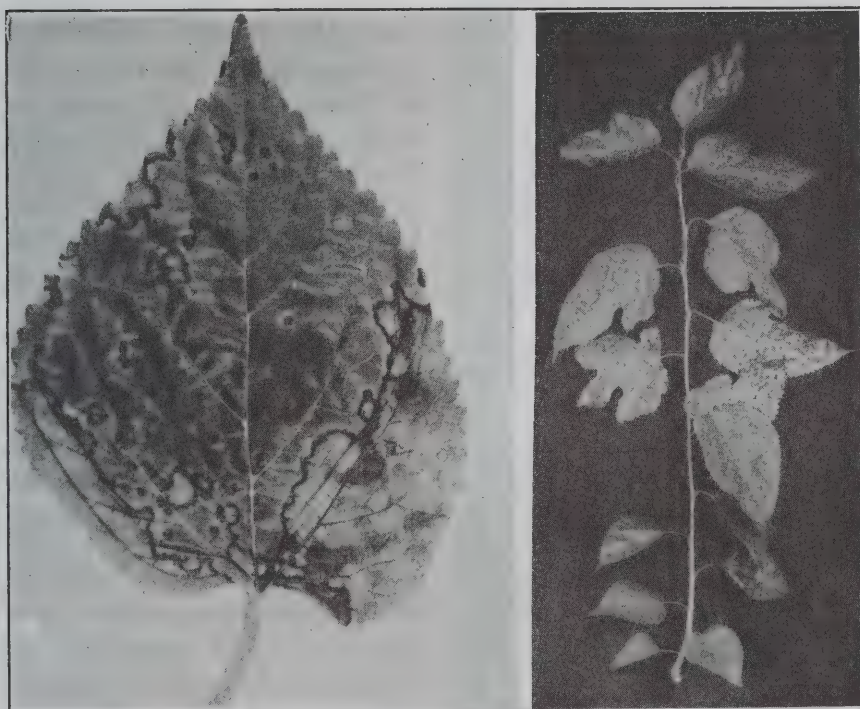
the leaves.

Studies show that foliar diseases reduce the protein content upto 33% in mulberry leaves. Yield



**Table : Major diseases of mulberry and their control measures**

Diseases	Name of the pathogen	Season	Control method	Safe period (days)
Root rot	<i>Fusarius solani</i> and <i>F. oxysporum</i>	Throughout year, more during rainy	Root dipping of saplings in 0.1% Bavistin solution & planting in pits dusted with 3-5 g Dithane M-45 or use of <i>Trichoderma harzianum</i>	—
Root knot	<i>Meloidogyne incognita</i>	Throughout	Soil application of Neem oil cake 92 ton/ha/yr) OR Furan 40 kg/ha/yr	NIL 45
Leaf rust	<i>Ceroteilum fici</i>	Winter	Foliar spray of 0.2% Foltaf/Kavach	3
Leaf spot	<i>Cercospora moricola</i>	Rainy	Foliar spray of 0.2% Bavistin	3
Powdery mildew	<i>Phyllactinia corylea</i>	Winter	Foliar spray of 0.2% Bavistin	3
Leaf blight	<i>Alternaria alternata</i> <i>Fusarium</i> spp.	Throughout, more during summer	Foliar spray of 0.2% Foltaf	3-5
Bacterial blight	<i>Pseudomonas mori</i>	Rainy	Foliar spray of 0.1% streptomycin or streptocyclin	7



**Foliar diseases reduce leaf yield and quality as well**

loss due to various diseases is estimated to be around 10 to 15% per year. It means, that in a mulberry variety having a potential to produce 35,000 kg leaf/ha/yr, the loss due to diseases varies from 3500 to 5250 kg leaf, which would have been sufficient

to rear about 350 to 500 dfls. This clearly indicates the necessity to better manage the diseases.

It is always advisable to take precautionary measures to prevent diseases rather than trying to control them after their occurrence. In certain cases like root rot,

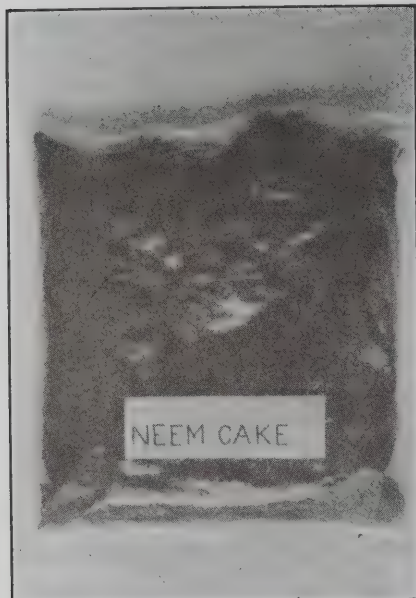
control is possible only if the disease is identified in the early stage. Diseases can be prevented to a great extent by following the cultural methods which are mainly aimed at keeping the inoculum out and to prevent its multiplication and spread. Reduction in the initial pathogen population is a principal component of disease prevention. There are several methods to achieve this.

### Preventive measures

**Use of healthy planting materials :** Root knot, root rot, viral and mycoplasma diseases very often get into healthy garden through infected saplings/cuttings. Use of healthy saplings/cuttings can prevent the introduction of these serious diseases in mulberry.

**Destruction of crop residues:** Crop debris is one of the main sources of inoculum in mulberry. Infected crop debris left in the garden often possess fungal spores which remain inactive during unfavourable seasons and infect the plant when conditions become favourable. Hence, crop debris





**Organic amendments help in disease prevention**

should be suitably disposed of by burning or composting. Composting restricts spread of the inoculum, substantially.

**Use of clean farm implements:** Soil borne pathogens such as *Fusarium solani*, *Meloidogyne incognita* and *Phoma* causing root rot, root knot and collar rot in mulberry spread through farm implements, besides other means. A little care in washing the implements, before and after use,

can help prevent the introduction of these diseases in healthy gardens.

**Soil-solarization:** This is the disinfection of the soil by solar heat. A deep ploughing after each pruning exposes the soil pathogens to sunlight and they get killed through desiccation. Soil solarization is far more effective in nursery beds. Covering the nursery beds with polyethylene sheet enhances the efficacy as more heat will be trapped which increases the soil temperature high enough to inactivate the pathogens. Solar heating has the added advantage of weed control and improving crop even in non-infected soil.

**Restricting irrigation:** Irrigation water often works as an effective means to spread the inoculum of nematode, soil borne fungi and bacteria. Hence, care should be taken to avoid passing water from infected garden to healthy one.

**Use of organic amendments:** Organic amendments such as oil cakes, straw and green mulching have both disease preventive and control effect. Incorporation of these in sufficient quantities enhances the multiplication of soil

microflora, many of which such as *Trichoderma* and *Bacillus* are highly antagonistic to soil borne pathogens of mulberry that cause diseases on roots.

Besides, chemicals recommended for control of diseases can also be used. The major diseases of mulberry, time of occurrence and the chemicals recommended for their control is narrated in the table.

### **Application of chemicals**

**On the foliage:** Preventive spray should be given in those areas where there is earlier record of high incidence and leaf loss due to diseases. The fungicides should be prepared just before its use and sprayed once before the disease initiates. The spraying should be done preferably in the morning or evening. The chemicals should fall on both surfaces of leaves for better efficiency. Fungicides should also be sprayed on the soil surface, as many pathogens hibernate in the soil. If needed a second spray should be given after 15 days.

**Preventive measures for soil-borne diseases:** Neem oil cake (2 ton/ha/yr) or Furadan (40 kg/ha/yr) should be applied in the soil before taking up the plantation as a general pre-cautionary measure against root knot disease. In case of root rot disease, root system of healthy saplings should be dipped in 0.1% Bavistin solution (2 g in 1 ltr water) for half an hour and planted in pits dusted with 3-4 g Dithane M 45. These cultural practices will help the farmers to keep their mulberry garden free from inoculum. Maintaining the garden free from diseases ensures bumper leaf yield which is the first step towards a successful silkworm crop.



**Preventive spray of fungicides keep away the diseases**

**The author is with CSRTI, Mysore.**



# Creativity in Cocoon Crafts

T.V. Vathsala

**I**t was altogether a different world, colourful and creative; the hall of the Sericulture Training School at Channapatna on the Bangalore - Mysore highway was full of eye-catching displays. Garlands, flowers, flower vases, dolls, wall hangings, greeting cards and many more made-outs of the waste

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***Bye-product utilisation and management deserves a special mention which could make sericulture further more attractive. Cocoon handicrafts is not only an answer to one's natural instinct to do something 'special', but also to generate additional employment and revenue. Here is a way out to fine tune one's creativity.***

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cocoons. Amidst, busy was a group of young women trainees trying to give a shape to their imaginations selecting cocoons, cutting them into various shapes, putting colours, arranging and rearranging them to suit the designs, sticking them onto the paper boards or stitching and so on.

"....The display of cocoon handicraft gives women a wealth of ideas to develop their skills"



opined a visitor from DANIDA. Mr. Ronald Currie, Secretary General of the International Silk Association, France says, "cocoon craft is a very interesting bye-product of sericulture".

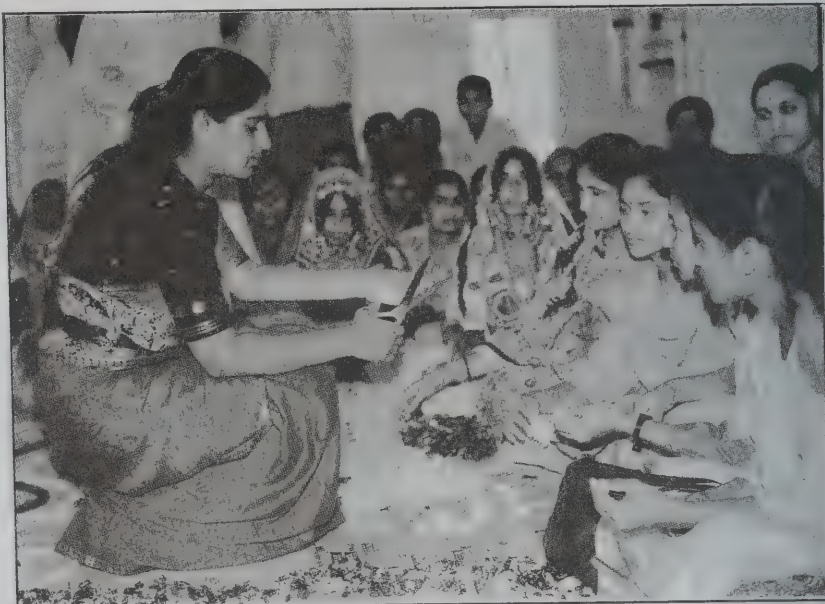
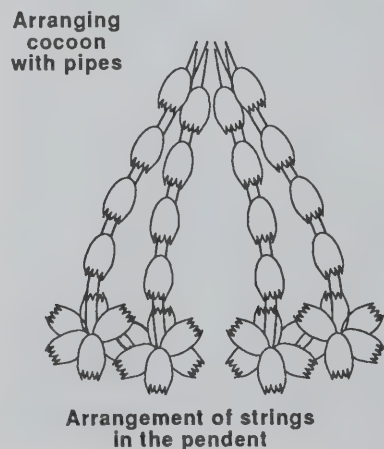
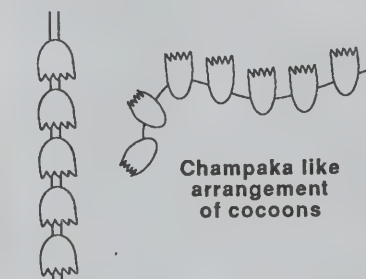
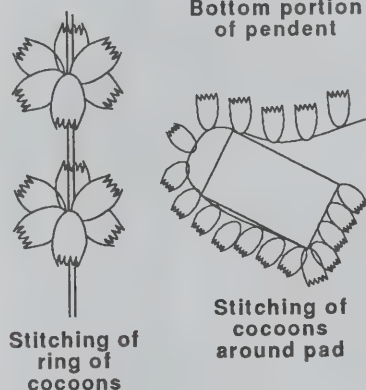
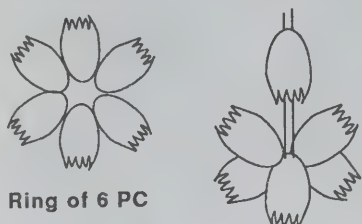
Yes, I am talking of the silk cocoon handicraft, one of the fine arts where one can exhibit his (more aptly, her) artistic talent and skill. Here, the rags can turn into riches. All that it needs is some

skill, spare time and of course, an urge to do something special.

With its unlimited potential, sericulture, is one such profession where hardly anything goes waste. However, a waste can also generate supplementary revenue.

Studies by the Central Silk Board have indicated a vast scope for auxiliary enterprises. Both the on-farm and off-farm sectors of the industry have a potential to

### Techniques of cocoon cutting and stitching

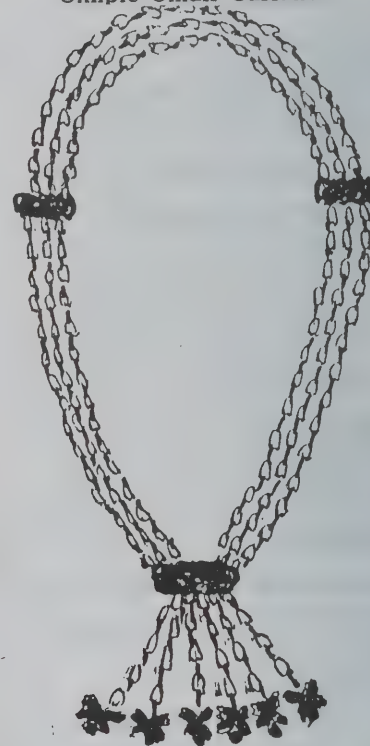


convert their wastes into bye-products of commercial value. It is estimated that there could be a value addition of 10% to 25% in various sectors of post-cocoon with effective management and utilisation of the bye-products. As such, mulberry leaves and fruits are used in medicines and food, oil is extracted from silkworm pupae, sericulture bye-products are used in cosmetics, paper industry and pharmaceuticals. Conversion of different silk wastes into useful products is gaining importance. Utilisation of cut and pierced cocoons in handicrafts is steadily increasing and gaining popularity. In this context, Sericulture Training School at Channapatna is an intermediary organization which has set an example in popularising this craft.

Sericulture Training School at Channapatna, 60 kms away from Bangalore, is the place of pride where such an opportunity is offered to budding entrepreneurs to exhibit their talent. The school is functioning under the Department of Sericulture, Government of Karnataka.

This activity can well be considered as a self-employment at free-time with minimum

### Simple Small Garland



Raw materials used		(Rs.)
Plain cocoons		120
Coloured cocoons		84
		<u>120</u>
Plastic pipes of 1 1/4" size		120
Thread		
Cost of Production		
Cost of cocoons		9=00
Wages		12=50
Other materials like thread, pipes, dyes etc.		8=00
		<u>29=50</u>
Handling charge at 10%		3=00
		<u>32=50</u>
or Rs. 33 per garland		



investment, but considerable profit.

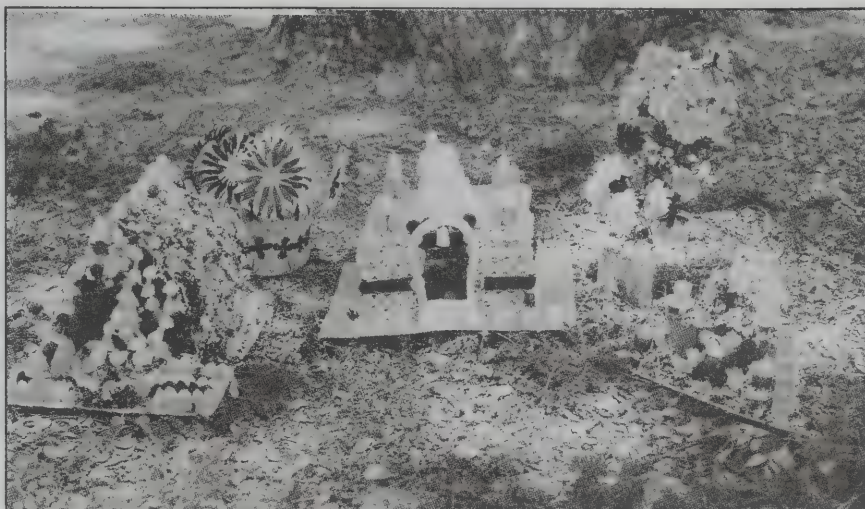
The training began in June '94 mainly because of the initiation and personal interest of Smt. Manjula Devi, then Asst. Director of Sericulture and the Principal of the school, in sharing her talents. It educates the skilled women entrepreneurs to be economically self-dependent. Candidates from almost all districts of Karnataka have been trained so far. Quite interestingly, out of 487 trainees, only nine were men.

### How to get in ?

An eligible candidate with an artistic bent of mind is selected for one month training by the Deputy Director of the concerned district with the assistance of local Sericulture Extension Officers involving mahila mandals. At a time, two batches of ten trainees each selected from two different districts of Karnataka, are trained with a stipend of Rs.400/- per candidate. Boarding and lodging facility is provided.

The candidates are trained to cut, clean and dye the pierced cocoons to make five specified and standard patterns of garlands. Besides, one can attempt on artistic items like flower vase, wreath, pen stand, dolls, jewellery, wall hangings, wall plates, clocks, greeting cards, bouquets and many more. Bivoltine pierced cocoons are hard to handle; yet, greeting cards, flowers, bouquets can be made. The trainees with better skill and zeal are given opportunities to make items of their interest.

Now, skilled candidates educated upto SSLC with knowledge in tailoring which facilitates cutting are joining the training. It has made such a good impact that there are instances where candidates were ready to undergo



## The Brain Behind

*Smt. K.N. Manjula Devi\*, Assistant Director of Sericulture, Sericulture Training School, Channapatna is the brain behind cocoon craft training. While sericulture is a profession, cocoon craft is a passion for her. Other hobbies of this post-graduate in science from Mysore University include embroidery, bead and zari work, fabric and oil painting, wooden work, satin cloth paper making, Ikabana and metal embossing.*



*Her fascination for this art made her to create various artistic pieces out of cocoons spontaneously. "Smt. Anita Prasad, IAS, at Tumkur was the first lady to recognise my art and made me to exhibit it in an exhibition there. She encouraged me to impart training to others. Since I was not a trained trainer, I was hesitant to take up this job", says Smt. Manjula Devi.*

*"Cocoon craft training is an*

*additional job besides the departmental work. Yet, I enjoy such a work because it sharpens my artistic skill and talent. I am able to carry on this job just because of the good support that I received from the office and the family, she recalls.*

*A visit to the museum in the school which she maintains depicts a picture that she can make anything under the sun out of pierced multi-voltine cocoons. She dreams of a separate*

*department for cocoon craft training and proceed in a big way, making it export oriented. "Our women folk could add to the income of their own and their family, through this cocoon craft, in their leisure time, sitting at home", remarks Smt. Manjula Devi.*

**\* Presently working at Karnataka State Sericulture Research and Development Institute, Bangalore.**



### Simple Garland with Side Hangings



Raw materials used	(Rs.)
Plain cocoons	778
Coloured cocoons	322
	<u>1100</u>

Other materials like thread,  
Jute thread, Plastic pipes etc.

#### Cost of Production

Cost of cocoons	50=00
Wages	75=00
Cost of other materials like dyes, thread, pipes etc.	22=50
	<u>147=50</u>
Handling charge at 10%	14=75
	<u>162=25</u>

or Rs. 162/- per garland



cheaper rate.

On completion of the training, the school issues a certificate. The trainees are also provided with a pass book certifying them as artisans, by the Cauvery Emporium. It enables them to avail credit facility, participate in the exhibitions and market their produce. The trainees are also guided on the different sources of raw materials.

### Feedback

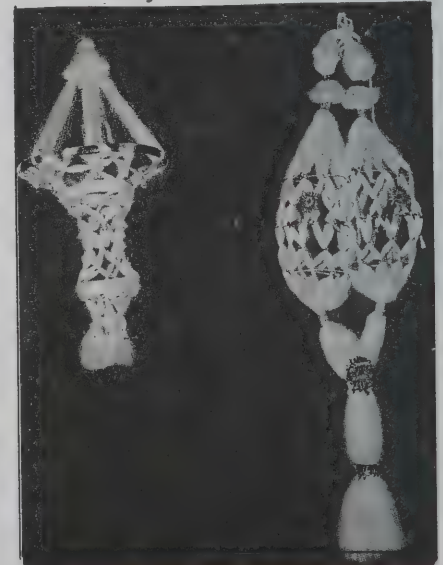
At the end of training, opinion of the trainees is obtained to evaluate and monitor the programme. Follow-up action is also taken based on the feedback received from the beneficiaries, once they have taken up the profession. Concerned District Officers are requested to keep in touch with the beneficiaries and act as a 'link' between the artist and the school in solving the problems. When the crafts person applies for a subsidy, the Department certifies on the cocoons purchase receipt issued from the concerned grainage, to release subsidy after cross checking it. Such a crosscheck is a means for feedback to find out as to how many trainees have taken up this craft seriously as a profession and how far they are making

use of the subsidy?

"There is no dearth of raw material for practising this craft, except for seasonal ones due to climatic vagaries" claims Smt. Neelam S. Mehta, Joint Director (WIS), DOS, Karnataka. "The trainees can make enough profit out of minimum investment", she adds.

### Subsidy

The trained candidates will get around 50% subsidy when they purchase cocoons from the state government grainages. The state has granted Rs. 5 lakh for the purpose. So far, candidates from Dharwad, Chitradurga, Raichur and Gulbarga districts have availed this subsidy and are doing good



training even without the stipend, asserts Smt. Manjula Devi.

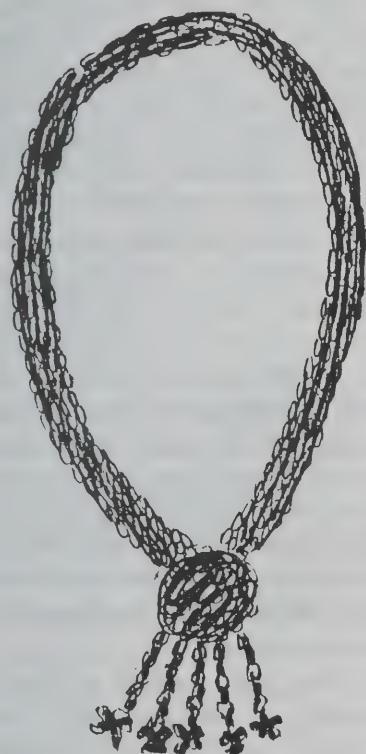
'We use about five kg of multivoltine cocoons per batch/month', said the principal. 'Generally cold dyes are used in preparation of the craft items which are available easily in the market. One hundred gm of dyes is sufficient for 1000 cocoons. The school provides the raw materials required during the training. The craftsmen from far off places like Bellary, Raichur and Bidar etc., come to Bangalore to buy the raw material since they are available here at a



**Table : Candidates trained in cocoon craft**

Year	No. of candidates
1994-95	186
1995-96	163
1996-97	148
<b>TOTAL</b>	<b>487</b>

**Jasmine bud like whole cocoon garland**



**Raw materials used (Rs.)**

Plain cocoons	1248
Coloured cocoons	60

**1308**

Other materials like plastic ball cloth, etc.

**Cost of Production**

Cost of cocoons	66=00
Wages	80=00

Cost of other materials like dyes, ball, cloth etc.	18=00
-----------------------------------------------------	-------

**164=00**

Handling charge at 10%	16=40
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**180=40**

or Rs. 180 per garland



marketing outlets for their produce. They are tipped of the stalls or counters at Village Employment Board, Khadi Gramodyog Bhandar, Cauveri, Kaluani, stall at Janata Bazar, Mysore Dasara and other exhibitions, fairs and cart festivals etc. For better marketing opportunities, the trainees are advised to keep in touch with such sales counters, enquire about the kinds of products, designs, quantity and also to meet the customer's requisite demand.

The state Department of Sericulture has taken initiative and

made it almost compulsory for all the state government organisations and offices to use cocoon garlands during official functions. The district officers are also requested to encourage the trainees by purchasing their products for various departmental functions and through other channels such as Grameena Udyoga or District Marketing Committees. The state grainages do involve themselves in promoting/popularising the cocoon craft and its remunerative benefits amongst the sericulturists.



business in cocoon garland making.

**Marketing outlets**

At the end of the course, the trainees are briefed about the



### Workshop

The trainees of the school also conducted workshop at Bidar to promote the cocoon craft. Recently, about 40 rural women from the district were trained in a 12 day workshop organised by the Nehru Yuvaka Kendra, Agriculture Centre, Bidar Literary Committee and Halladakeri Women's Committee of Home Industry for Silk. Nehru Yuvaka Kendra assured financial help to those who wish to seek self-employment through cocoon craft. Such a support is very much essential for a craft to survive and gain popularity.

### Findings

Surprisingly enough, the cocoon craft has become more popular in north Karnataka, where there is a dearth of cocoons than in south - the traditional home of sericulture. Being a new concept,

there is a good demand for cocoon garlands, here and the trainees are getting a good bargain for their meagre investment. If this craft is pursued by a graineur, he need not invest on cut cocoons also. In such cases, it is the profit all the way.

"This craft is still in its infancy and yet to gain momentum and to work out any systematic channelisation of this craft requires some time. Hence, concentrating on DWACRA groups which produces

For more details, contact :

**The Principal,**  
Sericulture Training School  
Department of Sericulture  
Government of Karnataka  
CHANNAPATNA.  
Bangalore Rural  
Karnataka.

on a large scale, would help to systematise the craft", feels the Joint Director (WIS). "You have to cultivate a taste for these products among the general public. Thus, such a programme needs wide publicity at village, taluk and city levels. For this purpose, video films should be produced and books to be printed about the craft", she adds.

The active participation of non-governmental agencies in popularisation of this craft, especially in rural areas and also in training more and more people in this craft is rather essential, as they are more familiar with the locals.

For better marketing prospects, it is necessary to involve various handicraft and business promotion organisations in popularising the cocoon products both at national and international levels and to bank on its value-based economics. Establishment of outlets in busy tourist spots, big markets, public places like airports, railway stations and bus stands etc. would induce systematic marketing of the cocoon products.

Thus, this budding art-based avocation with ample potential can be developed into a profitable venture, if nourished well. A planned approach to popularise the art with a special emphasis on training, product diversification, raw material availability and better marketing would certainly go a long way in encouraging the new entrepreneurs to come up with a number of new products of utility and artistic value. Such a venture not only ensures additional revenue to the silkmens, but also makes sericulture further attractive.

**The author is with Indian Silk, Central Silk Board, Bangalore.**

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# Vermiculture : Scope and Potentiality in Sericulture

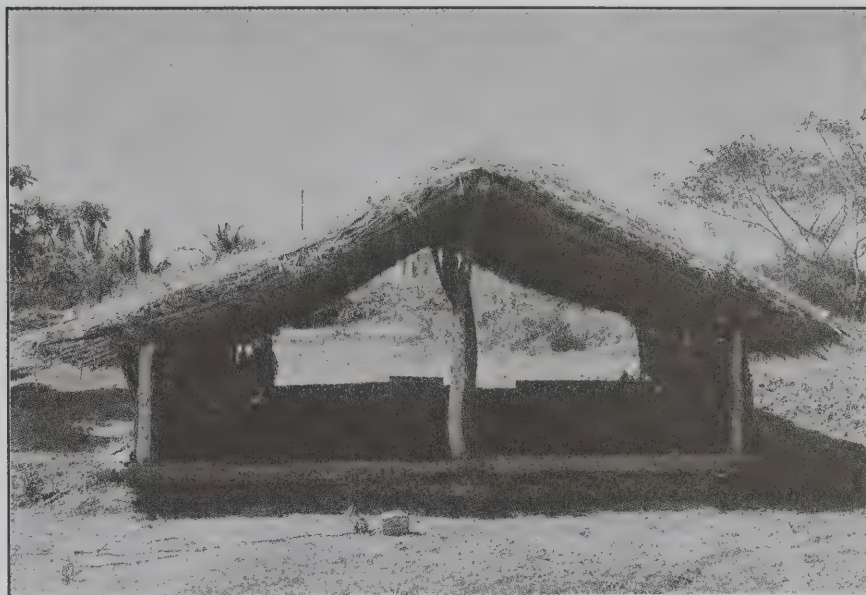
P.K. Das, K. Bhogesha, P. Sundareswaran, Y.R. Madhava Rao and D.D. Sharma

**V**ermiculture technology is the use of earthworms as versatile natural bio-reactor for rapid conversion of organic wastes into value added manure. The earthworms feed on the wastes of

---

**'Vermiculture' holds out a good prospect for transforming the colossal sericultural wastes into vermicompost. Besides being economical as compared to FYM, this organic manure is richer in nitrogen, phosphorous, potash, micronutrients and enzymes, thus, promoting the luxurious growth of mulberry leaves leading to better quality and overall productivity. The authors dovetail the methodology of vermicomposting with sericultural wastes and the research findings in this regard at CSRTI, Mysore.**

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**Fig. 1. A view of vermy for vermicomposting**

organic origin and produce vermicasts which is rich in nitrogen, phosphorus, potash, micronutrients, enzymes and vitamins suitable for crop growth besides a useful micro-organisms. This technology has already been perfected and commercialized in countries like U.S.A., Canada, U.K., Mexico, Germany, Japan, Taiwan and some East Asian countries.

In India, specially scientists at the Agricultural University, Bangalore, have perfected the technology of vermicomposting of agricultural wastes. Since then this technology has been used for obtaining substitute organic fertilizer in shorter duration for using in sustainable agricultural development programmes. Research is in progress at various institutes/universities in India on the

vermiculture technology for efficient use of agricultural wastes. However, on information is available on the use of this technology for efficient utility and management of sericultural wastes.

## **Scope and potentiality**

Application of vermiculture technology in the recycling of sericultural wastes has a tremendous potential. In 1990-91, it was estimated that mulberry cultivation is practised in India in an area of about 313 thousand ha and there exists much scope for generating sericultural wastes of approximately 4.6 million ton/year taking an average leaf yield of 25 metric ton/ha/year and production of rearing wastes @ 60 kg for every 100 kg of leaf fed to silkworms. The availability of wastes at this





**Fig. 2. Sericultural wastes prior to vermicomposting**

rate will be approximately 15 ton/ha/year which will be equivalent to 280-300 kg nitrogen, 90-100 kg phosphorus and 150-200 kg potash. This waste is not properly utilized by most of the sericulturists and is burnt or used as cattle feed or utilized directly in the mulberry field which can also be a potential source of serious diseases in silkworm. In general, sericultural waste, especially silkworm rearing, has high nutrient value. Besides this, lignins, fats, oils, wax,

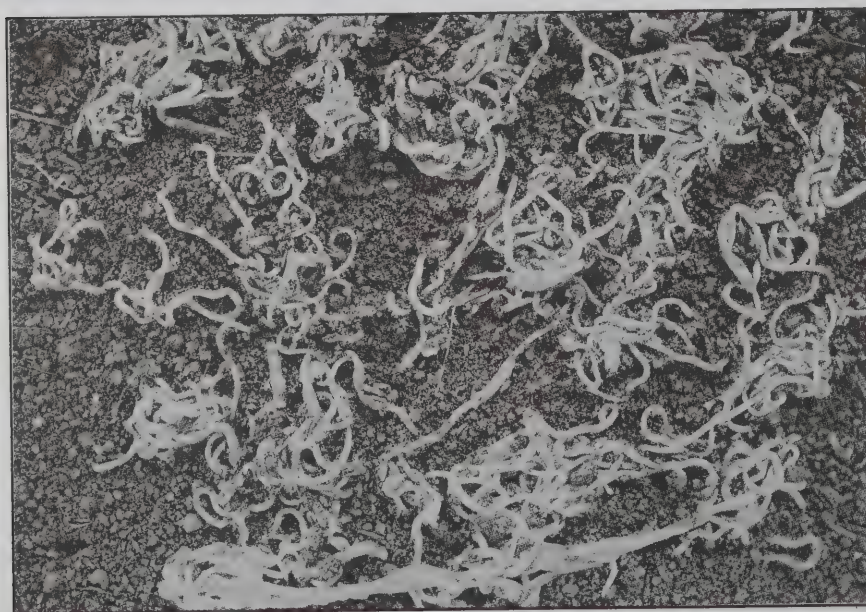
steroids, enzymes, hormones, pigments and vitamins are also present. Through vermicomposting, these wastes can be easily and rapidly converted into nutrient rich organic manure for efficient utilization of the wastes and improvement of soil fertility.

### **Vermiculture in sericultural waste management**

A vermary consisting of eight trenches each measuring approximately 2.4 x 0.6 x 0.45 mtr.

was dug parallel in two rows of four each (Fig. 1). The trenches were dug in a field measuring 7.5 x 6.0 mtr area slightly elevated from the ground level to avoid water logging during rainy season. The border of the area from all the four sides was thoroughly protected from predators by raising bunds with soil and stones. The inside of the trenches was lined with black polythene sheet to keep the worms from escaping into the surrounding soil, yet permitting drainage of excess water. All the trenches were also protected from direct sunlight, heat and rain by raising a thatched shed using local materials. The shed (Fig. 1) was constructed in such a way to provide proper shade and the atmosphere inside was allowed to remain cool and humid. A small channel was also dug around the shed to drain excess rain water during monsoon to avoid water logging.

Each trench was filled with 200 kg (on fresh weight basis) semidecomposed sericultural wastes comprising silkworm litter, rearing bed refuse, mulberry leaves, tender twigs and other farm wastes including weeds (Fig. 2). This bedding mixture was first treated in a separate pit by mixing all the wastes with a solution of water and biogas spent slurry (5 kg biogas spent slurry mixed with 100 ltr. of water) and allowed to decompose for one week. Where biogas spent slurry is not available, cowdung can be used. This brings down the high temperature generated during decomposition to normal atmospheric temperature and makes it suitable as feed for earthworms. The amount of bedding mixture was just enough to fill each trench leaving atleast 15 cm empty from top to facilitate turning the material from time to time for loosening and for



**Fig. 3. Earthworms used for vermicomposting**





Fig. 4. Sericultural wastes after vermicomposting



Fig. 5. Vermicasts after sieving

Table 1. Economics of vermicomposting (1 acre farm)

Details	Cost (Rs.)
Construction of a thatched shed (20'x15')	3000.00
Construction of 2 trenches (10'x5'x1.5')*	232.00
Cost of 1000 earthworms (As starter culture)	100.00
Total cost	3332.00
Depreciation cost (for 5 years)	666.40 /yr.**
Labour charges for 1st year. (25 mandays @ 5 mandays per cycle for 5 cycles & Rs. 58.00/manday)	1450.00
Expenditure from 2nd year	2116.40
Income from 5 mt. vermicompost production	10000.00 ***
Net profit (income from vermicompost- expenditure from 2nd year)	7883.60
OR	
Saving on FYM 8 mt. (since 5 m.t. of vermicompost is more than 8 mt. of FYM in terms of quality)	3200.00 /yr+
* Each trench can hold 600 kg waste and 1.2 mt. of waste can be composed in each cycle.	
** Thatched shed can be used atleast for 5 years.	
*** @ Rs. 2000/ton of vermicompost	
+ @ Rs. 400 ton of FYM.	

sufficient aeration, since earthworms cannot survive in very compact condition.

A mixed culture of earthworms (*Eudrilus eugeniae*, *Kisenia fetida* and *Perionyx excavatus*) obtained from Department of Zoology, University of Agricultural Sciences, Bangalore and mass multiplied at CSRTI, Mysore as stock culture (Fig. 3) was introduced in the bedding mixture @ 300 g (approximately 2000 in number) juvenile worms per trench. The trenches were left for earthworms activity for a period of seven weeks. During this period, the feed material in the trenches was kept moist (approximately 40% moisture) by sprinkling water on every alternate day and turned once or twice for aeration. After seven weeks, from each trench the composted

material (Fig. 4) was harvested and earthworms were separated by sieving through a wieremesh and loose granular vermicasts (vermicompost) was collected (Fig. 5).

### Research findings at CSRTI, Mysore

It was observed that the bedding mixture in each trench was completely converted into loose granular vermicasts of brown to black without any foul smell. Before introducing earthworms, the material had foul smell. The whole process took about seven weeks from the date of introducing earthworms in the feed. The earthworms also multiplied during the process. There were large number of earthworms cocoons (Fig. 6). The microbiological investigations of the vermicasts revealed the presence of a number of useful micro-organisms free from plant pathogens. The worms assimilated about 5-10% of the feed and the rest was excreted out as loose granular vermicasts. From each trench, approximately 180-190 kg vermicasts was recovered out of 200 kg waste. It was estimated that by this process approximately 1.4 to 1.5 mt. of vermicompost can be produced from eight trenches in every 7-8

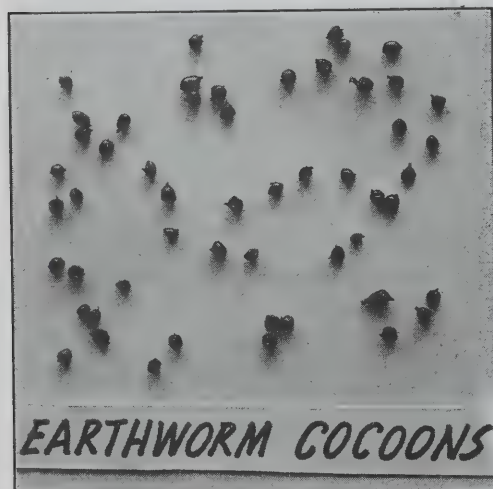


Fig. 6. Earthworm cocoons

**Table 2. Effect of vermicompost on mulberry leaf yield and quality [Pool of 1 year (5 crops)]**

Treatments	Leaf yield/ ha/yr (kg)	N%	P%	K%
Vermicompost @ 5.6 mt/ha/yr	49.772	3.833	0.290	2.075
FYM @ 20 mt/ha/yr	49.130	3.668	0.290	2.020
Chemical fertilizers common dose @ 300:120:120 NPK kg/ha/yr.				

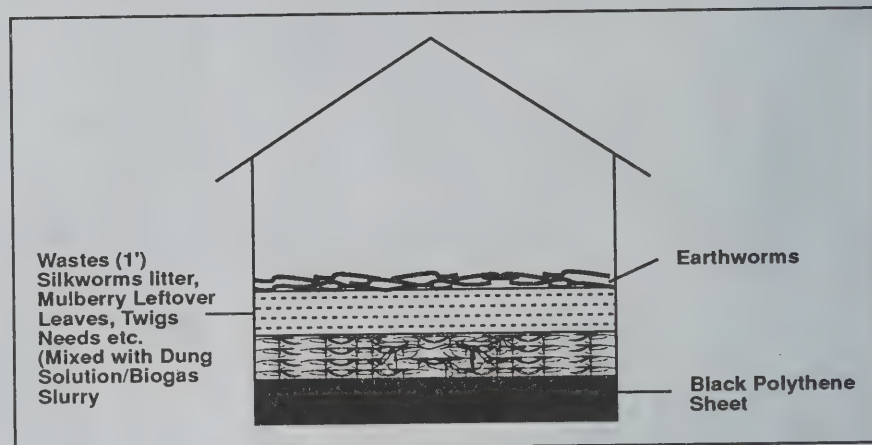


Fig. 7. Diagrammatic view of a vermitrench (T.S)

weeks. The trenches can be six times in a year and about 8 to 9 mt. of vermicompost can be prepared. However, for utilizing the wastes from one hectare of mulberry garden (approximately 15 mt.) by this method, one can load about 300 kg semidecomposed waste in each trench to produce about 13-14 mt. of vermicompost. Further, it was estimated that 1.5 kg of juvenile earthworms of the species is required to convert one ton of wastes into vermicast. The same worms can be utilized atleast 4-5 times and rejected when they become adult (Table 1).

The chemical analysis of the vermicasts revealed 1.875% nitrogen, 0.6% phosphorus and 1.0% potash, besides 84.6 ppm zinc, 1247.3 ppm iron, 509.7 ppm manganese and 61.5 ppm copper as against ordinary FYM which contains 0.3% nitrogen, 0.2% phosphorus and 0.3% potash besides 14.5

ppm zinc, 1465 ppm iron, 69 ppm manganese and 2.8 ppm copper. The efficacy of this vermicompost was also studied in mulberry garden and was observed to be significantly superior over ordinary farm yard manure as recorded from leaf yield and leaf quality even at an application rate of only 5.6 mt./ha/yr as against full dose of FYM (20 mt.) (Table 2).

Hence, it is clear that sericulture can be much benefitted adopting this technology. This will create an awareness among farmers to be less dependent on chemical inputs leading to low cost of production of mulberry. In this field, further studies are being conducted at CSRTI, Mysore, with a view to economize mulberry cultivation as well as to improve the soil fertility for sustainable sericulture.

**The authors are with Central Sericultural Research and Training Institute, Mysore.**



# Pest and Disease Occurrence in Mulberry and Silkworm : A Survey

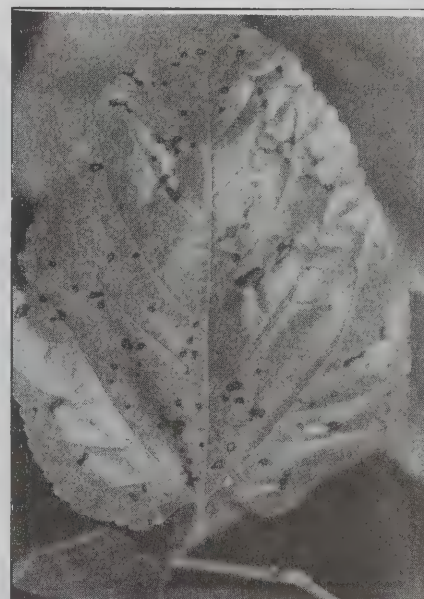
K.V. Benchamin, P. Venkataramana, S. Thimma Naik and Y.N. Sanath Kumar

***Seasonal occurrence of pests and diseases in mulberry and silkworm can cause severe damage to the crops and adversely affect productivity thereby driving the sericulturists to the brink of losses. A survey conducted in Kolar district of Karnataka, a doyen among silk producing states, focuses on the incidence of a host of season-specific pests and diseases in mulberry and silkworms. Adoption of appropriate protection measures at the right time will go a long way in controlling the seasonal occurrence of pests and diseases which can, otherwise, play havoc with the farmers, opine the authors.***

**I**n the premier silk producing state of Karnataka, Kolar district alone accounts for 17.5% of the total mulberry area (29136 ha.), 29.9% of the cocoon production (21.261 mt) and 30% of the raw silk production (2503 mt). It also ranks number one in brushing capacity (1976 dfls/ha), cocoon production (726 kg/ha) and raw silk production (86 kg/ha). Even under the best field performance level, as in Kolar, the average leaf (estimated at 20 mt/ha/yr) and cocoon output (36.7 kg/100 dfls), indicates scope for further improvement in productivity. Both the mulberry and silkworm crop protection, appears to be the immediate step to be undertaken to boost the existing level of production and productivity.



**Root Rot disease**



**Leaf spot disease**

Regional Sericultural Research Station (RSRS), Bangalore conducted a survey through the Research Extension Centre (REC) at Madivala in Kolar district, to study the seasonality of pest and disease occurrence in both mulberry and silkworm crops and the extent of damage. The survey covered 40 to 50 farmers from 5 to 6 villages on rotational basis in the district and crop observation once in 15 days. Current analysis is based on survey data from 1993 to 1996 and more than 2000 observations from nearly 100 sericultural villages. Field staff involved in the survey were trained specifically on symptoms and features of various diseases and pests.



**Table 1. Results of Survey on Mulberry Diseases and Pests**  
(Average of 4 years 1993-96)

Mulberry Diseases/Pests	% of Incidence/Infestation monthwise											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Leaf Spot	-	-	-	2.52	1.82	3.28	2.73	3.25	3.01	2.55	4.09	3.70
Leaf Rust	-	-	-	-	-	-	-	-	1.50	1.04	4.90	1.93
Powdery Mildew	0.98	0.81	-	-	-	-	1.06	1.02	0.71	2.08	3.20	7.59
Root Knot	-	-	-	1.89	1.13	1.95	3.75	1.49	1.78	1.67	-	-
Root Rot	-	-	-	-	-	-	-	1.60	3.31	-	-	-
Mealybug (Tukra)	0.79	4.22	2.95	4.52	4.30	10.32	9.35	11.69	7.14	5.17	7.11	6.56
Bihar Hairy Caterpillar	-	-	-	-	-	-	-	-	-	0.91	5.00	16.37



**Tukra (Mealy bug) pest infested mulberry garden**

### Survey results

**Mulberry Crop:** During the survey, mulberry diseases like leaf spot, powdery mildew, leaf rust, root knot and root rot and pests like Bihar hairy caterpillar and mealybug (Tukra) were observed. The percentage of incidence of disease and pest infestation,

monthwise, is given in Table 1. The diseases and pests fall into two categories, first is general occurrence for a prolonged period, but causing maximum damage in specific season and the second is very specific occurrence for a limited period. The first category includes diseases like leaf

spot and powdery mildew and pest like mealybug (tukra). The second category includes disease like leaf rust and pest like Bihar hairy caterpillar. Leaf spot incidences ranging from 1.82 to 4.09% was observed during April to December, with 3 peaks in June (3.28%), August (3.25%) and November (4.09%). Similarly, powdery mildew occurs in July to February with the incidence ranging from 0.71 to 7.59% and peak in December (7.59%). Root knot is also observed to prevail during April to October with incidence ranging from 1.13 to 3.75%, the peak being in July (3.75%). Root rot is relatively a new disease reported to be occurring in recent years with a few farmers in Kolar and the plant mortality was observed during August - September.

**Silkworm Crop:** During the survey, occurrence of major three diseases of silkworm namely, muscardine, grasserie and flacherie

**Table 2. Results of Survey on Silkworm Diseases and Pests**  
(Average of 4 years 1993-96)

Mulberry Diseases/Pests	% of Incidence/Infestation monthwise											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Muscardine	1.36	-	-	-	-	-	-	1.00	1.55	5.19	9.66	5.86
Grasserie	1.11	0.70	0.60	2.98	2.34	2.73	3.59	4.03	3.88	2.87	3.14	2.55
Flacherie	1.00	1.00	0.75	5.96	4.50	5.22	4.87	6.31	7.33	5.40	3.40	1.73
Uzi-fly	1.34	0.90	0.60	4.80	5.39	6.05	8.07	8.17	9.05	7.57	7.89	5.34



was recorded. Pebrine disease test was not conducted and included in the study. Infestation of silkworm crops by uzifly pest was also recorded. The percentage of incidence of silkworm diseases and infestation of uzifly, monthwise, is given in Table 2. Among silkworm diseases, fungal disease 'muscardine' was limited to comparatively cooler humid months starting from August to January, with the incidence ranging from 1.00 to 9.66%, the peak being in November (9.66%). The viral disease 'grasserie' and the bacterial disease 'flacherie' were found to occur in all the months. In 'grasserie', the incidence ranged from 0.60 to 4.03% and in 'flacherie' from 0.75 to 7.33%. The incidence of both the diseases was low in cold dry months from December to March. But with the



*Grasserie affected worms*

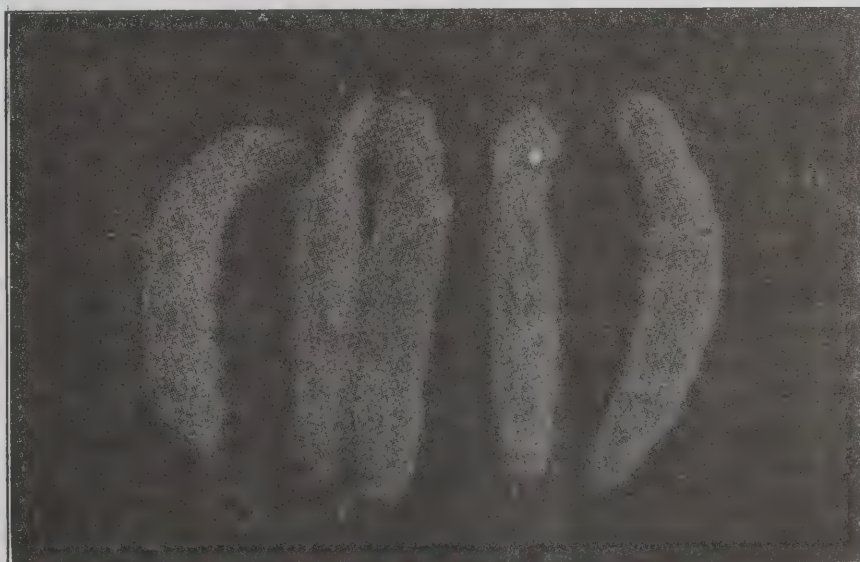
starting of hot dry months from April, both diseases occurred in higher proportion; the incidence of flacherie being more compared to grasserie. In humid months, incidence of both the diseases further increased. The peak incidence of grasserie disease was spread over July-September, while flacherie was found during the period April to October, maximum being in August-September.

The only major pest of silk-

Table 3. Seasonality of Occurrence of Disease and Pest of Mulberry and Silkworm		
Crop & Disease/Pest	Season	
	General Occurrence	Peak Occurrence
<b>Mulberry</b>		
Leaf Spot	April-December	August-September & November-December
Leaf Rust	September-December	November
Powdery Mildew	July-February	November-December
Root Knot	April-October	July
Root Rot	August-September	September
Mealybug (Tukra)	Throughout the year	July-August-September & October-November-December
Bihar Hairy Caterpillar	October-December	December
<b>Silkworm</b>		
Grasserie	Throughout the year	July-August-September
Flacherie	Throughout the year	April-October
Muscardine	August-January	November-December
Uzifly	Throughout the year	July-August-September

worm is uzifly and the infestation is noticed in all the months. During January to March, the infestation is very low ranging from 0.6 to 1.34%. Starting from April (4.80%) uzi-infestation increases steadily and reaches the peak in September (9.08%). The infestation is high all through the humid months from June to

November. It may be added that the infestation rate reported is that of the farmers who are using mostly nylon net alone as protective measure against uzifly. The infestation in open type of silkworm rearing without net, is usually high in the range of 25 to 30%, though such cases are negligible.



*Muscardine affected silkworms*

**Table 4. Rate of Incidence of Pest and Diseases of Mulberry and Silkworm**

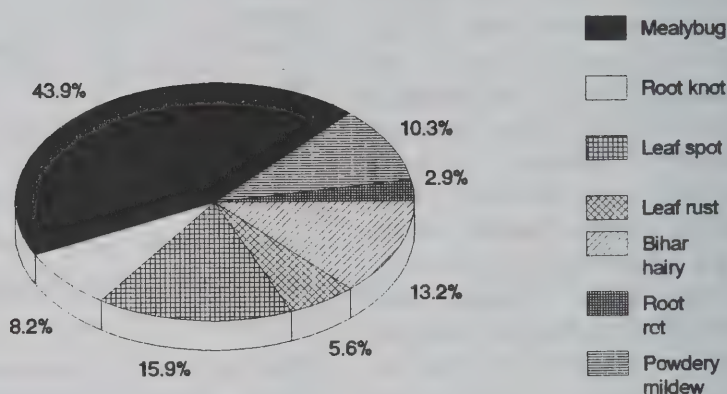
Crop & Disease/ Pest	Rate of Incidence/ Crop Irrespective of season %	Rate of Incidence/ Crop during season %
<b>Mulberry</b>		
Leaf Spot	2.24	3.51
Leaf Rust	0.78	4.90
Powdery Mildew	1.45	5.39
Root Knot	1.15	3.75
Root Rot	0.40	3.31
Mealybug (Tukra)	6.17	7.35
Bihar Hairy Caterpillar	1.86	10.69
Total	14.05	—
<b>Silkworm</b>		
Grasserie	2.54	3.83
Flacherie	3.96	5.66
Muscardine	2.05	7.76
Uzifly	5.43	8.44
Total	13.98	—
Grand Total	28.03	—

### General implication

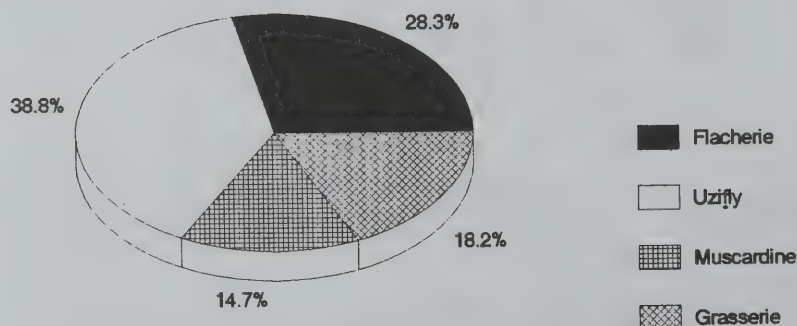
**Seasonality of occurrences:** There were a few exceptions like occurrence of leaf spot right from

the months of April instead of June, due to onset of early monsoon and the occurrence of mealybug pest causing 'tukra' throughout the year instead of limiting to summer alone. Mealybug infestation was found to occur in three continuous peak periods April to June, July to September and October to December. Another observation of concern is the report on the occurrence of root-rot, a fungal disease of the mulberry root that can spread and kill the whole plant rapidly. Seasonality of the occurrence of different pests and diseases of mulberry crop is given

**Share of pest and disease of mulberry crop in total infestation/incidence**



**Share of pest and diseases of silkworm crop in total infestation/incidence**



in Table 3. Grasserie and flacherie diseases were characteristic of hot humid months, muscardine occurred in rainy and winter seasons and uzi pest almost throughout the year.

**Rate of incidence:** The rate of incidence of diseases or infestation of crop by pests was recorded as percentage of plants or silkworms affected. On an average, such incidence is about 14% of the crop, each in mulberry and silkworm. Mealybug (6.17%), among pests and leaf spot (2.24%), among diseases affected mulberry, maximum (Table 4). Uzi-fly infestation of silkworm is about 5.43% per crop irrespective of seasons. Flacherie (3.96%) among silkworm diseases was the maximum incidence.

Of the total mulberry plants affected by pests and diseases, mealybug causing 'tukra' damage alone accounts for 43.9%, followed by leaf powdery mildew (10.3%). In silkworm, maximum damage is caused by uzifly accounting for 38.8% followed by flacherie (28.3%), grasserie (18.2%) and muscardine (14.7%).

Though the incidence of diseases and pests is low in general, they can cause severe crop damages in specific season. Thus



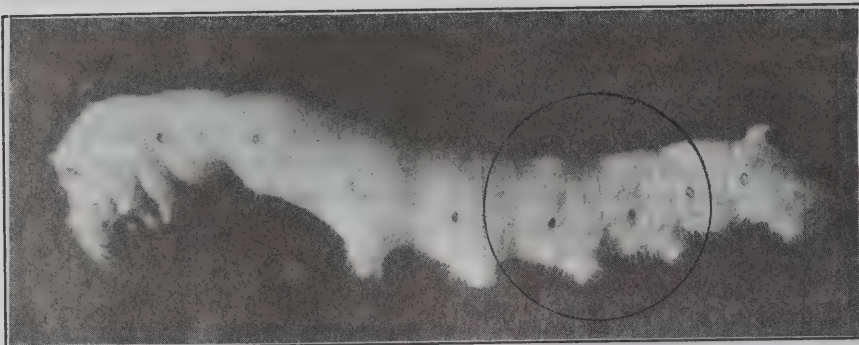
**Table 5. Ready Reckoner on different Pest and Diseases of Mulberry and Silkworm Crops and their Preventive measures**

Crop Pest/Diseases	Preventive/Control Measures
<b>MULBERRY</b>	
Leaf Spot	Systemic fungicide carbendazim. 0.1% carbendazim solution in water foliar spray. 200 to 250 litres solution per acre. In case of severe infection second spray after 10 days of 1st spray. Safe period for silkworm rearing, after 8 days of the spray.
Powdery Mildew	Spraying of fungicide Dinocap 0.2%, Mix 400 ml of Dinocap in 200 litres of water for one acre of mulberry garden. Safe period for silkworm rearing, after 10 days of the spray.
Leaf Rust	Spraying of fungicide carbendazim or Dinocap 0.2%. Mix 400 ml fungicide in 200 litres of water for one acre of mulberry garden. Safe period for silkworm rearing, after 10 days of the spray.
Root Rot	Uprooting of infected and dead plants and burning. Soil disinfection using chloropicrin @ 500 gm per 100 M <sub>2</sub> , applied in 2 to 3 feet deep holes, is effective. Soil drenching at the base of the plant with 1% Bordeaux mixture solution or 0.2% Bavistin (Carbendazim 50% WP) solution is also recommended. Bio-fungicide <i>Trichoderma herzianum</i> is also effective.
Root Knot Nematode	Deep digging or tilling and turning of soil in summer. Application of neem oil cake @ 400 kg per acre in 4 split doses. Application of nematicide (Aldecab or Carbofuran) @ 12 kg per acre in 4 split doses alongwith fertilizer is also recommended. Safe period for silkworm rearing after 45 to 50 days of application of nematicide.
Bihar Hairy Caterpillar	Collection and destruction of egg neasses and gregarious young larvae of the pest. Deep ploughing and flood irrigation of plot to kill the pupae. Spray 0.2% of Dimethoate (safe period 13 days) or DDVP (safe period 17 days) on mulberry plants to kill the caterpillars.
Mealybug (Tukra)	Removal of affected portion of the plant and burning. Spray 0.01% of perathion (safe period 13 days). Releasing of mealybug predator beetles <i>cryptolaemus montrouzieri</i> @ 250-300 per acre.
<b>SILKWORM</b>	
Grassarie (NPV)	Disinfection of rearing and mulberry storage rooms, appliances and premises with formalin (2%) or bleaching powder (5%) solution. Surface disinfection of eggs with 2% formalin. Ideal rearing hygiene and environment. Effective disposal of infected and diseased worms. Good air circulation in late age rearing stages. Use of bed disinfectant like RKO @ 2-3 gm. per sq. ft., once after each moult before resumption of feed and an additional one on 4th day in V instar.
Flacheire (Bacterial Disease)	Disinfection of rearing room, mulberry storage room, mounting room, appliances and premises. Disinfection of egg surface. Good rearing management - nutrition, rearing hygiene and environment. Effective culling out of unequal and disposal of affected worms.
Muscardine (Fungal Disease)	Disinfection of rearing, mulberry storage and mounting rooms, appliances and premises with formalin (2%) or bleaching powder (5%) solution. Good rearing hygiene-avoid low temperature and high humidity. Effective disposal of diseased worms and bed refuse. Use of anti-muscardine bed disinfectants like formaline Chaff or Dethane M45 or Captan (1% in early instars and 2% in IV & V instars) or RKO @ 2-3 gm. per sq. ft.
Uzi-fly	Collection and killing of uzi maggots in hot water. Wire mesh or nylon net protection to rearing house. Spraying of uzicide on silkworm body, as per schedule. Release of <i>Nesolynx thymus</i> , hyper parasitoids of uzi. near rearing, marketing and reeling sites. Use of 'uzi-trap' in and around rearing room.

leaf rust in mulberry in specific season (November) is almost six times more than the average annual incidence rate. Powdery mildew incidence in peak season (November-December) is almost four times more than the average rate in other seasons. Similar is the case of infestation of mulberry pest, Bihar hairy caterpillar in December season. In case of silkworm, a similar pattern is seen in muscardine disease in peak season (November-December), compared to the incidence in other seasons (Table 4).

#### Quantification of crop loss:

No quantification of crop loss due to pests and diseases of mulberry and silkworm was attempted in the study. Since the observations were based on either the number of plants or worms affected to the total, it also indicated the unproductive portion of the population and indirectly the possible damage that it could cause in terms leaf or cocoon yield. Thus on an average one percent loss means roughly 24 kg. mulberry leaf/acre/crop (considering over all yield to be about 12000 kg/acre/year in 5 crops) and about 0.60 kg of cocoon/100 dfls (considering 60 kg cocoon yield/100 dfls). Thus 14% leaf reduction/acre/crop or 1680 kg of leaf reduction/acre/year is equivalent to 150 dfls of silkworm rearing and potential yield of 90 kg. of cocoons, valued at Rs. 13,500/- @ Rs. 150/- per kg. Another 14% incidence of diseases and pests of silkworm means a loss of 8.4 kg. of cocoons per 100 dfls and a total loss of about 84 kg. for the possible 100 dfls rearing per acre per year, valued at Rs. 12600 @ Rs. 150/- kg. of cocoons. The total loss on account of pests and diseases of mulberry and silkworm crops put together, will be above Rs. 25,000/- per



**Silkworm body with uzi fly eggs**

acre/year. The seriousness of the loss and its value have not been realised by farmers as a whole. However, the projected loss is purely an estimate and more realistic assessment is required in future to relate the intensity of pests and disease occurrence with the exact loss in terms of quantity and value.

#### **Crop protection measures**

All the diseases and pests of mulberry and silkworm crops oc-

curing in the region can be prevented by adopting appropriate protection measures. A ready reckoner is given in Table 5. Emphasis should be made to follow the integrated management wherever possible.

Both the mulberry and silkworm crops are affected by a number of diseases and pests. Though individual disease or pest occurrence in general is low and many a time fail to be noticed, their total impact by way of eco-

nomie loss is highly significant. It is also true many such diseases and pests cause havoc to the mulberry or silkworm crops in specific season. Greater awareness of the farmers about mulberry and silkworm pests and diseases, timely forewarning to adopt appropriate preventive and protective measures, emphasis on adopting integrated management measures, etc., will go a long way in improving productivity by avoiding crop losses. It is also necessary to monitor constantly the occurrence of pests and diseases in all major sericultural districts and to publish the statistical report on the same by the Department of Sericulture in each state.

*The authors are with Regional Sericultural Research Station, Kodathi, Bangalore.*

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OLIVE



# Induced Mating in Tasar Moths

S.S. Rath

**I**nadequate seed production in tasar sector is mainly due to unsuccessful grainage. The mating percentage in the grainage is not upto the desired level and about 30% of females remain unmated. It needs to augment the grainage efficiency. Besides natural mating, induced and mating under nylon net enclosure are in practice. Although the nylon net enclosure is

***Induced mating under nylon net enclosure helps to a great extent in reducing the percentage of unmated female moths in the grainage paving way for improving seed production in tasar sector. The article reveals a device for improving mating success in the unmated female moths.***

proved to be ideal for increasing mating chances in virgin females upto 65% (of the total females taken), yet it is not sufficient to meet the present day demand. A systematic approach with new technologies proved successful varying from 87.5 to 95.26%.

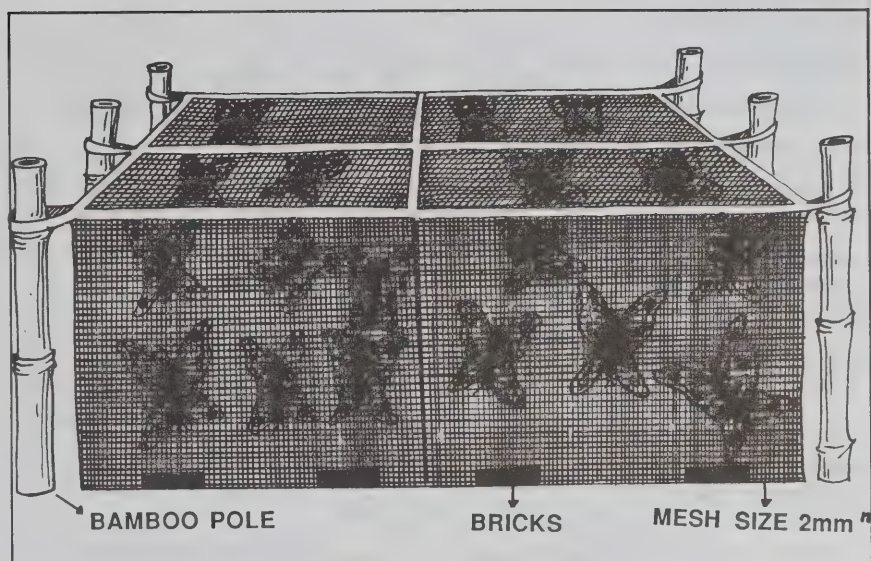


Fig. 1. Erection of nylon net

## How to fix the nylon net ?

The nylon nets of 2.2 mm mesh size can be erected in a cool and shady place with bamboos, the free ends touching the ground made tight by placing bricks. This prevents the entry of predators like lizards, birds and rats (Fig. 1).

## Operational Technology

- Left over virgin female moths along with males in the ratio

of 1:1.5 are released inside the nylon net in the afternoon by 4 for mating.

- The age of male moth should be preferably one day (in case of emergency 2 day old male moths may be used).
- According to the utilizable surface area of the net, the moth density should be maintained @ 0.25 sq. ft. per moth.

M	M	F	M	F	M	F	M	F	M	F	M	F	M	M
M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
M	M	F	M	F	M	F	M	F	M	F	M	F	M	M
M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
M	M	F	M	F	M	F	M	F	M	F	M	F	M	M
M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
M	M	F	M	F	M	F	M	M	M	M	M	M	M	M

Fig. 2. Systematic placement of moths inside the net

**Table. Economics of nylon net method used for mating  
(Base year 1995)**

Particulars	Net Dimension (in ft.)		
	6' x 3' x 4.5'	6' x 6' x 4.5'	10' x 8' x 5'
	Size A	Size B	Size C
Cost of Nylon net	Rs. 120/-	Rs. 180/-	Rs. 300/-
Durability in terms of Grainage (@ 10 operations/Grainage)	3	3	3
Cost of Nylon net/operation	Rs. 4/-	Rs. 6/-	Rs. 10/-
Mandays required for use of Nylon net /operation	1/2	3/4	1
Labour charges @ Rs. 40/day	Rs. 20/-	Rs. 30/-	Rs. 40/-
Total expenditure operation	Rs. 24/-	Rs. 36/-	Rs. 50/-
No. of female moths/operation	160	232	416
Expected No. of pairs to be obtained/operation	146 (91%)	216 (93%)	387 (93%)
Expected No. of Dfls. to be prepared/operation @ 90% of pairs)	131	194	348
Sale proceed of Dfls. @ Re. 1/- per dfl.	Rs. 131/-	Rs. 194/-	Rs. 348/-
Net profit/operation	Rs. 107/-	Rs. 158/-	Rs. 298/-
Investment recovery (In terms of operations)	1.12	1.14	1.01

- Moths should be placed inside the nylon net in a systematic way so that one female is surrounded by 3 to 4 males (Fig. 2).
- Reject vigourless male and female moths regularly.

- Avoid light during night.

### Benefits

The nylon nets are quite effective and can be used as an additional device for increasing the grainage efficiency in a better way. It helps in two ways.

- It proves more fruitful when the grainage is running at its peak by minimising the crowding of the moths and thereby giving enough opportunity to fresh ones to undergo mating.
- The older female moths (one day old) are getting equal opportunity for mating under the nylon net enclosure which may otherwise remain unmated inside the grainage.

### Economics

The details of the economics are presented in the Table. The total expenditure is not very high and the investment can be fully recovered after 1.12, 1.14 and 1.01 operations for the different sizes of net studied.

By adopting this additional device, the present mating rate of 70% can be increased upto 95%. The method is undoubtedly acceptable owing to its efficacy and quite feasible on economical point of view. A seed production unit can very well adopt this method to increase the efficiency for meeting the demand.

**The author is with CTR&TI, Ranchi, Bihar.**

### CAUTION

The delayed monsoon is on. June to October is the period when farmers opt for new mulberry plantation. The planting material is scarce, especially of the improved varieties and farmers are in search of the seed cuttings or saplings. Here comes the danger of introducing mulberry diseases, especially those of foliage or stem in case of cuttings and those of root borne, in case of saplings. Farmers must give adequate attention to select disease free mulberry plots for seed cuttings. Reject those infested by scale insect and avoid selection of Tukra (mealy bug) infested plots. If unavoidable, collect only the top dressed cuttings and transport to the new location for planting.

In case of saplings, threat is of introducing root knot or root rot through the infested roots. Don't take a chance. Dip the roots of the saplings in 0.1% Bavistine solution, for minimum of half an hour and apply Dithane M45 @ 3 to 4 gm per pit or furrow, before planting. For all diseases, prevention is better than cure.



# Staff Training for Efficient Sericulture Development

M.K. Sethu Rao

**S**ericulture is a special type of land based enterprise at the village level. Farm families attach great importance to this enterprise because of quick, periodic and high economic returns. The

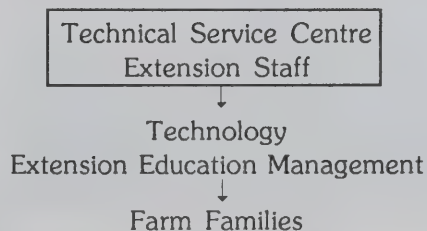
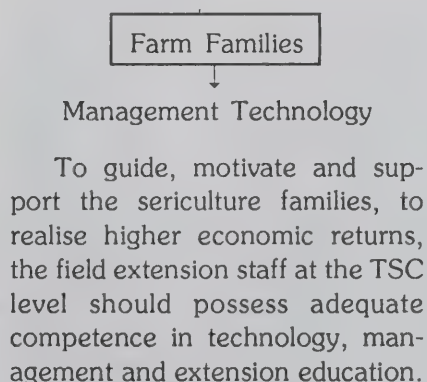
***Proper development of sericulture mainly hinges on an effective and efficient extension system fulfilling the tasks of informing, educating and acting as a catalyst of change. Since farm families constitute the backbone of sericulture, their knowledge and efficiency in mulberry cultivation and silkworm rearing largely determine the quantity and quality of the silk. The article peeps into the requisites of the training and the trainer.***

primary focus at the village level is on mulberry cultivation and silkworm rearing. There is hardly any need to emphasise the role played by families in sericulture industry. The efficiency of the

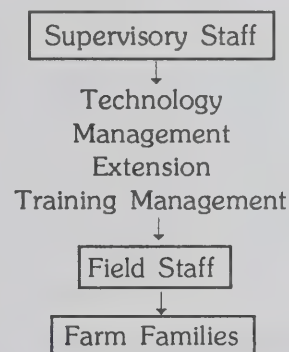
families in mulberry cultivation and silkworm rearing is directly linked to the quantity and quality of silk produced. This is the basic premise and challenge for sericulture extension system. The efficiency and effectiveness of the extension system depends the competency of the professionals and the available research output. To upgrade the competency of the extension functionaries a systematic Human Resource Development (HRD) through training as an inbuilt arrangement, is essential.

## Rationale for training

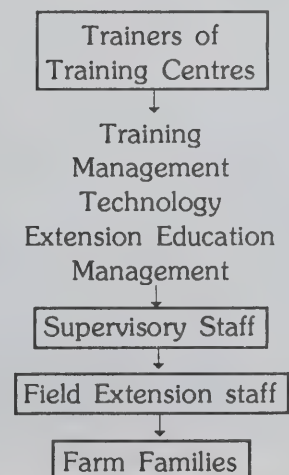
As farm families are the primary producers of mulberry leaves and cocoons, they should be competent in relevant technologies and management to realise higher returns.



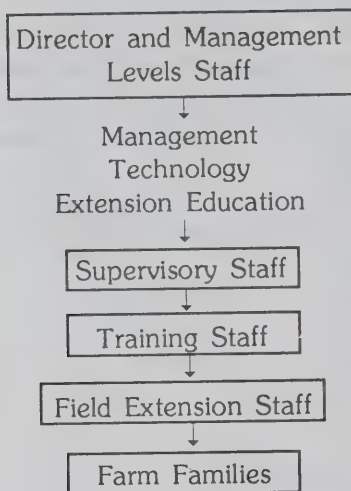
The supervisory staff like Asst. Directors and others supporting field extension staff need professional competence in technology, management, extension and training management to build up and sustain an effective extension organisation.



The staff at the sericulture training centres need to possess adequate competency in training management, extension education, technology and management to plan and implement different training modules relevant to various categories of staff.



The staff in the category of director, additional, joint and deputy directors need to possess higher competency in different functions and principles of management with special reference to extension management. In addition, adequate understanding of technology and extension education dimensions for efficient management of the organisation to realise different programme objectives, is also essential.



### Operational dimensions

In the above frame work, it is clear that extension professionals located at different levels of the organisation need training in the four major areas of –  
Technology,  
Extension Education,

Staff Training Content				
Staff	Technology (%)	Extension Education (%)	Management (%)	Training Management (%)
Field Level Staff	45	35	10	10
Supervisory Staff	40	35	10	15
Training Centre Staff	40	25	10	25
Director & Management Staff	20	20	50	10

Management,  
Human Resource Development (training management).

The important consideration is the proportionate mix of these areas for training with respect to staff located at different levels of the organisation with specific roles and responsibilities. For instance, the staff located at TSC, work directly with farm families to educate and motivate them for adoption of relevant technologies. These functionaries like the sericulture demonstrators are rightly called as the change agents. They need different proportion of technology, extension education and management in contrast to the other staff located at different levels of the organisation. Keeping these aspects in view, a matrix has been developed for training the staff of state department of sericulture and other related organisations.

This is a broad frame work for staff development through training, though there may be some overlapping of roles between the functionaries at different levels. Special training modules are to be developed for each category keeping in view the training needs in the context of the respective job charts. Relevant institutions and resource persons are to be identified to support the staff training programme. The efficiency of the staff of DOS in the context of the emerging scenario on sericulture sector can be considerably improved through a well planned human resource development with a time bound programme for two-three years. Later special training and refresher courses can be planned in addition to induction training.

**The author is Director of Extension (Retd.), U.A.S., Bangalore.**

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# Mulberry Cultivation in China

Govindaiah, D.D. Sharma, A.K. Bajpai, and R.K. Datta

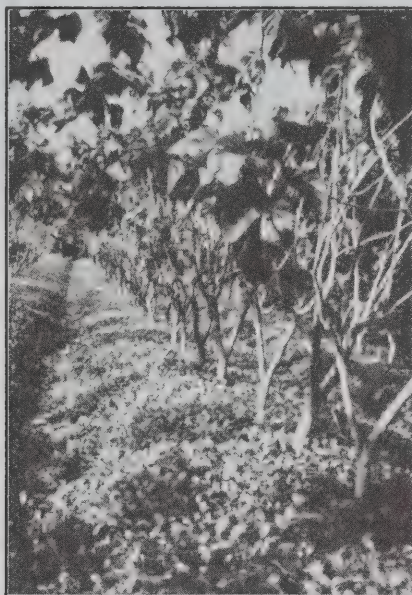
China stands number one in the world silk production, which accounts for two-third of total cocoon and silk production. Sericulture is practised in almost all the provinces and about 20 million families are engaged in it. Silkworm rearing is mainly carried

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**India can possibly take a leaf out of the Chinese practices of mulberry cultivation techniques mainly based on region and season specific. Region specific mulberry varieties have given a fillip to the sericulture in China. The article deals with these aspects of the Chinese sericulture for the possible benefit of the Indian industry.**

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out as a subsidiary occupation by the marginal farmers in the country side. The main areas of sericulture are Yangtze River valley including Sichuan, Zhejiang and Jiangsu provinces. Adoption of improved manural practices, use of high yielding and disease resistant mulberry varieties, supply of



**Fig. 1. Intercropping of alfa-alfa**

chawki reared worms of promising hybrids and effective method of pest and disease control signifi-

cantly improved the cocoon production after 1980.

## Raising of mulberry

Most parts of China receive moderately high rainfall and the temperature ranges between 10–20°C. Mulberry is grown as monocrop and to some extent as border or tree. Mulberry is mainly propagated through grafts which is carried out during March to April. Stock mulberry is generally resistant to pest and diseases and also adverse conditions while Scion is from high yielding varieties. The length of stock is about 4-5 inches with oblique cut on one side and little roots on other. Scion is about 2-3 inches with a bud on top and cone like triangular base which is inserted into the bark of stock in



**Fig. 2. Husang series - high yielding variety**





Fig. 3. Garden with ridges and furrows system and wider spacing

opposite direction and planted in soil. In addition, mulberry saplings are also raised through seeds which help maintain hybrid vigour in  $F_1$  seedlings. In India, mulberry is propagated mainly through cuttings and to some extent through saplings. Therefore, use of saplings need to be encouraged in case of high yielding varieties for better establishment of garden. The use of grafts may be popularized in temperate conditions.

### Planting of mulberry

Generally speaking, North China, where high rainfall and low temperature prevails, adopt wider spacing compared to close spacing/high density of plant followed in South China. In South China, along with Pearl River area the spacing is 2' x 0.5' similar to that of Kolar system of planting in India. In Zhejiang province, the spacing followed is 3' x 2' and 4' x 2'. In North China, wider spacing like 5' x 3' and 5' x 4' is generally followed with high bush plantations. Hence, depending on the rainfall, temperature and climatic conditions, there is need to adopt different spacings for mulberry cultivation in India.

**Manuring :** Application of high doses of fertilizers and leaf dressing helps in maximising the yield. Abundant soil moisture is available round the year. NPK @ 300:120:150 kg ha/year is applied mainly during spring, summer and autumn crops. Organic manure @ 75–100 ton/ha/year which mainly includes pig, cattle, poultry manure and tank silt is applied six times in a year along with winter fertilizers i.e, two times during spring in March and April, two times in sum-

mer in May and July and one each during autumn (August) and winter (December). In Jiangsu province, the fertilizer application is different. About 1.5 tons ha/year is recommended with 2:1:1 ratio (750:375:375 kg N:P:K/ha/year). Fifty percent of fertilizer is applied after summer cutting and 25% each in spring and autumn season. In addition to chemical fertilizers and organic manures, various intercrops like *Astragalus sinicus*, broad bean and alfa-alfa are raised during winter, while in summer sesbania is practised. These intercrops when fully grown are mulched in the soil to improve fertility. In India also, intercrops suited to our conditions like legumes may be raised during rainy season and be mulched in soil for better soil management.

### Training of mulberry

The pruning heights of mulberry in China decreases from North to South depending on the temperature and rainfall. In South China, mulberry is pruned at 15 cm above the ground level while in Central China between 15–70 cm and in Yellow River



Fig. 4. Raising of mulberry with paddy - a common scene in China





**Fig. 5. High yielding mulberry ready for autumn rearing**

area 70–150 cm above the ground level. In North China, where temperature is low, mulberry is pruned at 150 cm above the ground level. Mulberry is generally pruned once in a year during summer in May–June. To avoid incidence of *Mycoplasma* dwarf diseases, pruning is also done during spring. In order to avoid wastage of leaves, during rainy season and for better growth of plants, high cut of mulberry is preferred.

#### **Leaf harvesting**

Mulberry leaves are harvested 6–8 times in a year in China. Number of harvests and leaf yield range from North to South with leaf yield ranging 35–45 tons/ha/year. During spring season, shoot harvesting is practised. In summer shoot lets are fed while in autumn individual leaf picking and feeding is done. Thus, the type of leaf harvesting and feeding is seasonal.

#### **Resource of mulberry varieties**

China has rich mulberry resource. Out of 26 species reported, 14 species are distributed with more than 2000 germ plasm varieties. It currently has about 40 good commercial mulberry varieties adopted to various areas. Husang 32, Husang 197, and 7, the main varieties, belong to *Morus latifolia*. Recently evolved varieties like Yu 2, Yu 151, Yu 237 are also quite popular. The promising mulberry varieties like gloosy big flower are common tree (border) varieties grown in Sichuan province. Varieties have been evolved to suit different agro-climatic conditions. Such as lunjiao belongs to *M. atropurpurea* southern subtropics (Pearl river area), Cocks comb Lu mulberry and black lu mulberry for Yellow River area like Shandong province and heigelu and bolo mulberry varieties for Shanxi and Hebai province.

Similarly in India, region specific mulberry varieties need to be developed.

**The authors are with CSRTI, Mysore.**

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# Training Courses of Central Silk Board

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	2. Basic Stock and Farm Management	6	Nov.
	*3. Post Graduate Diploma in Specialisation in Tropical Sericulture	12 months	1st October
	*4. Diploma in Mulberry Sericulture	6 months	1st October
<b>RSRS, ANANTAPUR/SALEM</b>	1. Chawki Rearing Techniques	10	Nov.
	2. Integrated Pest Management	4	Dec.
<b>RSRS, KODATHI</b>	1. Integrated Pest Management	4	Dec.
<b>RSRS, COONOR</b>	1. Chawki Rearing Techniques	10	Nov.
<b>CSR&amp;TI, BERTHAMPORE</b> Central Sericultural Research and Training Institute, Central Silk Board, BERTHAMPORE - 742 101 Dist. Murshidabad (W.B.)	1. Seed Technology	14	October
	2. Reeling and Spinning	14	October
	3. Farm Management	6	November
	4. Soil Testing and Rectification	6	December
	5. Integrated Soil Nutrient Management	6	December
	*6. Diploma in Mulberry Sericulture	6 months	1st October
<b>CSR&amp;TI, PAMPOR</b> Central Sericultural Research and Training Institute, Central Silk Board, P.B. No. 88, GPO, SRINAGAR - 190 001, J & K.	1. Mulberry Cultivation Technique	5	December
<b>CTR&amp;TI, RANCHI</b> Central Tasar Research and Training Institute, Central Silk Board, Piska Nagri, RANCHI - 835 303, BIHAR.	1. Refresher Training	14	December
	2. Reeling and Spinning	6	Alternate Months from January
<b>SSTL, KODATHI</b> Silkworm Seed Technology Laboratory, Carmelram Post, KODATHI, BANGALORE - 835 035.	1. L.S.P. Training Programme	6	December
	*2. Short Term Course in Seed Technology	3 months	1st October
<b>CSTRI, BANGALORE</b> Central Silk Technological Research Institute, B.T.M. Layout, Madivala, Hosur Road, BANGALORE - 570 068.	1. Raw-Silk Testing & Grading Interpretation	14	October
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	3. Silk Dyeing & Printing	30	December
	*4. Short Term Course in Post Cocoon Technology	3 months	1st October

\* Structured Courses

Note : For further details, please contact the Directors of respective Institutes.



## All India Textile Conference

The 53rd All India Textile Conference will be held at S.S.M. Institute of Textile Technology, Komarapalayam in Erode of Tamil Nadu on December 20 & 21, 1997. Organised by the Textile Association (India) (TAI) Erode unit, the theme of the conference will be 'Managing Quality for Growth in Textiles'.

All India Textile Conference is a prestigious event in the textile industry and provides a platform for the industrialists, technocrats, researchers, machine manufacturers and allied industries to exchange views and information with experts from India and abroad. The ensuing conference will specially focus on the modern developments in machinery, quality control and assurance, cost monitoring and control system and modern technology for superior products.

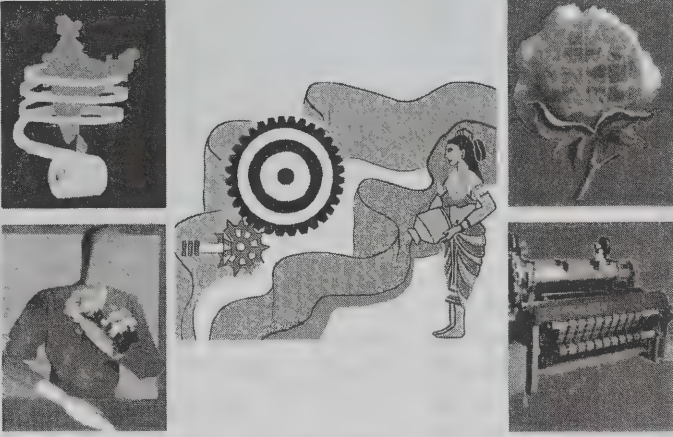
The TAI is the largest and unique organisation of the professionals and technocrats associated with the textile industry. It has 27 affiliated units through out the country with a total membership of over 17,000. It organises seminars, conferences, workshops, refresher courses, exhibitions etc. for the benefit of the members and textile industry as a whole.

*Details regarding the conference can be had from :*

The Hon. Secretary,  
Textile Association (India),

### 53<sup>rd</sup> ALL INDIA TEXTILE CONFERENCE

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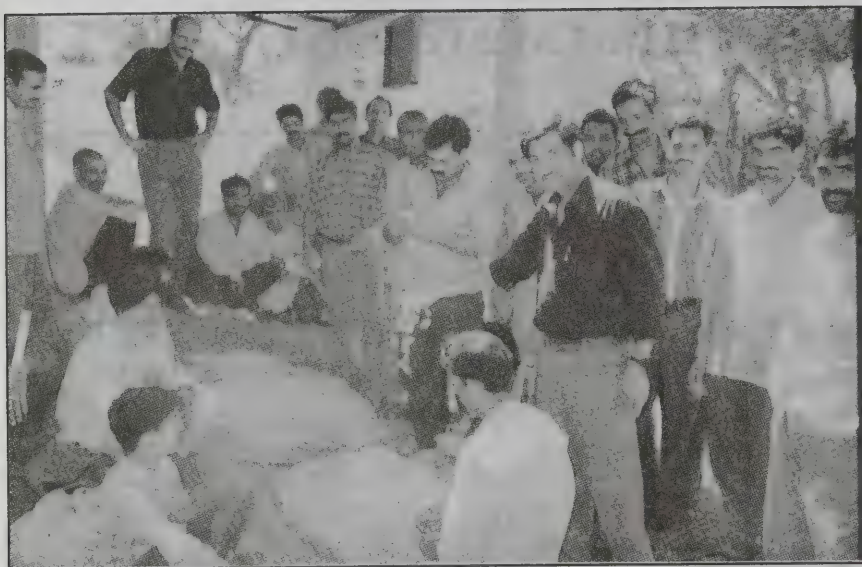
Tex India Fair, 97 - a three day textile and allied Machinery Exhibition - will also be organised at the same venue from December 19-21, 1997, coinciding with the conference.

*Further information can be obtained from :*

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## Cocoon Marketing helps Farmers



*A view of 'Green Cocoon' market*

The Research Extension Centre, Kathua, J & K, in co-ordination with the Department of Sericulture arranged for marketing of 'green cocoons' on an experimental basis for the first time at Kathua from April 15-21, 1997. There is a long standing demand from the rearers of this region for establishing a cocoon market at Kathua enabling them to dispose of their produce promptly and at the same time save money on transportation to Jammu.

Ninety six adopted rearers of the centre took part in the market-

ing and benefited by good remuneration. Conventionally, in the entire State of J & K, sun dried cocoons are sold which affect the reeling quality of silk. To overcome this disadvantage, the full quantity of cocoons marketed during the period was dried in "Ushnakothi" at the centre. It is expected that the present system of marketing will benefit the farmers and also bring about qualitative change in silk.

**Report: R.K. Fotadar, SRO, REC, Kathua, J & K.**

## Textile Museum in Mumbai

A textile museum encompassing all the segments of the textile industry will be set up in Mumbai by the Union Textile Ministry. The museum will come up soon in one of the NTC mills in the city, subject to the permission of the state government for the sale of the mill land.

The museum will be expected to educate the visitors about the history and progress of the Indian textile industry. At present, the country has six museums mainly developed to fabric exhibits.

According to Shri B.C. Khatua, Textile Commissioner, the proposed museum will be different from the other museums. This museum will exhibit the entire gamut products from fibre to machinery. Elaborate documentation on the history and progress of the industry will also be kept for ready reference by the visitors.

*(Source : Silknet)*

## Amendment to German Commodity Goods Act

A Fifth Amendment to the German Commodity Goods Act includes the following :

- Textiles containing banned A20 dyes imported or manufactured upto 31st March, 1996 can be traded inside Germany until 31st December, 1998 (the transitional period has been extended).
- Work clothes, protective clothing and uniforms which are not manufactured for private use, as well as second-hand goods can no longer be imported, but can be traded inside Germany also after 1st December, 1998.
- Commodity goods made from second-hand fibres can be imported or manufactured until 31st December, 1999.
- The legislation is applicable to clothing, clothing materials, bedding (including pillows and sleeping bags) towels, beach mats, air mattresses, masks, hairpieces, wigs, false eye-lashes, bracelets and other jewellery worn, pouches, rucksacks, blankets and textiles in close contact with babies and children, diapers, bandages, etc.
- Commodity goods containing pigments which may release banned amines can be manufactured or imported until 31st March, 1998.

*(Source: Silknet)*



## Union Textiles Secretary visits CSRTI, Mysore

Shri Prabhat Kumar, IAS, Textiles Secretary, Union Ministry of Textiles accompanied by Smt. Rukmani Haldea, Joint Secretary (Textiles) and Vice Chairperson, Central Silk Board, visited the Central Sericultural Research and Training Institute (CSRTI), Mysore, on May 23, 1997. Shri Arun Ramanathan, IAS, Member Secretary, CSB was present during the visit.

Dr. R.K. Datta, Director of the Institute, briefed them about the bivoltine silkworm hybrids ( $CSR_3 \times CSR_4$  and  $CSR_2 \times CSR_5$ ) evolved under the Bivoltine Sericulture Technology Development Project (BSTDP) in collaboration with the Japanese International Co-operation Agency (JICA). The dignitaries also evinced interest in the high yielding bivoltines such as KA, NB<sub>4</sub>D<sub>2</sub>, NB<sub>7</sub>, CC<sub>1</sub>, CA<sub>2</sub>, etc. They were also apprised of the progress of BSTDP Phase II.

The Secretary also released a new mulberry genotype V1 evolved by CSRTI which has a yield potential of 70 mt/ha/yr and ben-



*Dr. R.K. Datta, Director, CSRTI, Mysore briefing Shri Prabhat Kumar, IAS, Secretary (Textiles) about the bivoltine hybrids evolved by the institute. Also seen are Ms. Rukmani Haldea, IAS, Joint Secretary (Textiles) and Vice-Chairman, CSB and Shri Arun Ramanathan, IAS, Member Secretary, CSB*

eficial to the farmers of irrigated areas.

The dignitaries visited Molecular Biology and Tissue Culture Laboratories of the institute to have a first hand information about various research projects in

progress. They also appreciated the technologies developed for recycling of sericultural waste through vermiculture.

**Report: A.K. Ganguly and B.S. Pappu, CSRTI, Mysore.**

### Mulberry Silkworm Race Authorization

CSB has introduced a Mulberry Silkworm Race Authorization System in India and tested certain silkworm hybrids at several identified test centres during 1996. A Race Authorization Committee met on 8th May 1997 and considered four hybrids were suitable for authorization for commercial exploitation.

<u>Hybrids</u>	<u>Combinations</u>	<u>Breeder</u>
Multivoltine	1. BL23 X NB4D2	CSR&TI, Mysore
	2. BL24 X NB4D2	Karnataka
Bivoltine	1. CSR2 X CSR4	CSR&TI, Mysore
	2. CSR2 X CSR5	Karnataka

For more details please contact Director, Central Sericultural Research and Training Institute, Srirampura, Mysore-570 008.

## Swedish International Textile Fair

The 14th Swedish International Textile Fair will be held at Sollentuna Exhibition Centre, Sollentuna, Switzerland from 14-17th August, 1997.

Over the years, the exhibition has gained a strong position in the textile area and the forthcoming event has been strengthened with a new concept – Textile and Interiors 1997. Stress is also given to interiors and interior decorating details.

The trade fair highlights interior designs, fashion, colours, and shapes for domestic use. A wider range of new products will be presented thereby providing an opportunity to the visitors to pick up trends, ideas and inspiration for business. Textiles and Interiors

1997 is focussed on exhibition, trend information and practical workshops.

"Four windows to the future" is the working title of the Swedish Fashion Council's exhibition, which reflects trends in home decorating for 1998. Many exhibitors will be dressing a Window-an imaginative kitchen, bathroom, sitting-room, bedrooms, office or hotel room as a part of their 'extra input' in this year's event.

*More details can be obtained from –*

Ms. Monica Sandgren,  
Project Manager,  
Sollentuna Exhibition Centre,  
Box 174, S-19123  
Tel : + 468 92 59 00  
Fax : + 468 35 43 82

## Field Days on Sericulture

Field days to popularise sericulture were organised at Sevapuri, Badagaon and Cholaipur blocks of Varanasi district in Uttar Pradesh on June 9 and 10, 1997 under the joint auspices of the Research Extension Centre, Purvanchal Sericulture Development Project, Central Silk Board and the Department of Sericulture, Varanasi.

Farmers were motivated to take up mulberry cultivation during the monsoon through display of video films and distribution pamphlets on methods of raising mulberry nursery and plantation, silkworm rearing and facilities available for adopting sericulture.

Shri S.B. Saraswat, Deputy Director, PSDP, urged the farmers to take up sericulture to meet the demand of Banarasi weavers who presently depend on outside

sources. Dr. R. Kumar and Dr. R.K. Pandey, Assistant Directors, PSDP explained the economics of mulberry cultivation alongwith pulses and vegetables.

**Report: R.K. Pandey, Asst. Director, PSDP, CSB, Varanasi.**

## Eco-Testing Laboratory at NITRA

Shri Prabhat Kumar, Secretary, Union Ministry of Textiles, inaugurated the Eco-testing Laboratory set up at Northern India Textile research Association (NITRA), Ghaziabad, with the assistance of the Union Ministry of Textiles on April 17, 1997.

The Secretary called upon the various Textile Research Associations (TRAs) to undertake an assessment of their work to know each other's real strength and weaknesses. He also opined that repetition of work by different

## Promotion of hi-fashion Garments in USA

With a view to enable the exporters to tap the vast potential of U.S. markets for the hi-fashion silk garments, the Indian Silk Export Promotion council has chalked out a proposal, the salient features of which are :

- Designer/garment construction expert from USA will impart training and work in co-ordination with NIFT, New Delhi.
- Designers will conduct seminars at New Delhi to give first hand information on technical aspect, trends, colours, etc.
- Participating exporters will prepare their silk collections for taking to USA under the Buyer-Seller-Meet to be conducted in March, 1998.
- Publicity will be done in various textile magazines.

Interested exporters may get in touch with the Council for further details of the programme.

TRAs should be avoided.

Shri Alok B. Shriram, Chairman, NITRA Governing Council said the laboratory would provide additional testing facilities and it is one of the nine laboratories being set up by the Union Government in the first phase.

Two books entitled "Machinery Maintenance Manual-card" and "Vidyut Aapurti Paushan Avam Urja Sanrakshan" brought out by NITRA were also released by the Secretary on the occasion.



## Kissan Mela on Oak Tasar

A one-day Kissan Mela on Oak Tasar Culture was organised by the Regional Tasar Research Station at Imphal in Manipur on March 12, 1997.

Prof. I.S. Khaidem, Vice Chancellor of Manipur University inaugurated the mela. He called upon the research institutions and agencies to explore the possibility of fully tapping the potentiality of oak tasar through the latest technologies since the culture helps improve the socio-economic status of the poor besides preserving the flora and fauna.

The Vice Chancellor also distributed gold medals to two trainees from Manipur who topped in the PGDC training course in non-mulberry sericulture at CSR&TI, Ranchi.

Shri S. Debabrata Sharma, Director of Sericulture, Govt. of Manipur stressed the need for a joint effort by CSB and DOS for developing appropriate technolo-



*Prof. I.S. Khaidem, Vice-chancellor of Manipur University releasing the scientific brochure*

gies for popularising oak tasar culture.

Shri N. Ibohal Singh, Deputy Director, Imphal appealed to the farmers to adopt the new technologies for better returns.

Subject experts from RTRS, DOS, Forest and Soil conserva-

tion departments presented papers on various aspects of oak tasar culture, forest management and soil conservation at the technical session. About 200 farmers were benefitted by the programme.

**Report: N. Ibohal Singh, RTRS, Imphal, Manipur.**

## Directory of the Safe Dyes

The Dyestuffs Manufacturers Association of India has compiled and brought out 'Directory of Safe Dyes' with a view to apprise the textile industry of the availability of dyes meeting exporters requirements. With the promulgation of the German Consumer Goods Ordinance, the need for such a publication was all the more felt to answer the queries from the industry.

The directory lists out dyes such as acid direct basic, disperse, metal complex, mordant, reactive, solubilised vat, solvent, sulphur and vat and azoic coupling components.

The information has been presented colour hue-wise under different classes of dyes. The dyes listed are considered safe and none of the 20 banned amines is used in the manufacture of these dyes. It contains a list of company names and manufacturers of safe dyes.

The dictionary may prove useful to the processors and exporters.

For more information and copies (Rs. 150/- per copy) please contact:

Executive Secretary,  
The Dyes Manufacturers Association of India,  
296, Samuel Street, 4th Floor, \*Vadgadi,  
Mumbai-400 023.

(Source : Colourage)

## AEPC Design Centre

The Apparel Export Promotion Council (AEPC) will be setting up a design centre at Hyderabad in Andhra Pradesh. The centre will be third in the series in the country and the first of its kind in the city.

The centre will impart training to the artisans at the grassroot level with the help of National Institute of Fashion Technology (NIFT). Thus, the artisans will be exposed to NIFT designs enabling them to produce quality garments with latest designs to compete in the international market.

The training programme consists of courses in sewing machine

operation, machine mechanics, pattern/cutting, production supervision/quality control and finishing/packing supervision.

The centre will contribute to improve the quality and productivity of Indian garments in the international market especially in the changed context of global competition becoming a reality by 2005.

## **XVII ISC Congress**

The International Sericultural Commission (ISC) held its XVII Congress in Londrina (Parana, Brazil) from 22 to 26th, April 1997. The congress gathered 120 participants from 21 countries and the representatives from three international organisations, the UNIDO, the European Union and International Silk Association.

The various sections took an interest in the outstanding technical and scientific work in various countries in the fields of mulberry, bombyx mori, bacology, non-mulberry silkworms, and post-cocoon technology. The 'Economy' section placed all this research within the general framework of world silk market and was the chance to learn about the silk processing situation in various countries present in Londrina.

One of the most unexpected aspects of these reports was the idea that the mulberry tree and the silkworm, as well as their derivatives, could have very interesting applications in non-textile fields. In the Mulberry Section, an Indian research worker presented a report on 'the mulberry tree : medicinal plant'. Another report dealt with 'the nutritional value of mulberry berries'. Other reports pointed out the use of pupae in cosmetics or in animal feeding.

(Source : ISA News Letter)

## **Textile Speciality Chemicals**

Textile Speciality Chemicals (TSC) sector has to gear up to meet the surging needs of the world's fibre consumption which has been forecast to grow at 2.72% per annum by the year 2000. The global fibre consumption at 6.74 kg/head in 1995 is estimated to increase to 8.18 kg/head in 2000, showing a positive increase.

The textile chemical manufacturers have to face the challenge of producing bio-degradable products especially in the context of restrictions being imposed on the applications of a series of chemicals.

The range of issues to be covered by speciality chemicals is wide and complex, encompassing ecological and toxicological consideration, health and safety during storage, application and use and safe disposal of chemical on land, water and air. Thus, what is visualised is the staggering of the conventional TSCs whereas, environmentally benign products have become the top priority.

The chemicals used will be bio-degradable and engineered for the specific process requirements providing ease of handling, storing, dispensing and quality processing.

Many new chemicals, particularly polymeric systems will be studied to provide durability to washing. Integrated finishing treatments will be visible and depending on the chemical nature of the softener, other properties such as bactericidal, antistatic and soil release may be incorporated.

In the changing scenario to be witnessed by TSCs, the further shrink resistant treatments will have to conform to the prevailing environmental issues. Chlorination will be eliminated. Alternative oxidative or even reductive treatments may have to be brought in.

The wet processing uses approximately 100 litre of water and 15-20 Kwh of energy for every kilo of finished textile, which in turn consumes about 5 kg of oxygen and releases nearly 7kg of carbon dioxide. Besides, the manufacture and tending of garments add to the pollution.

The processing in supercritical fluid *viz.* CO<sub>2</sub>, which displays solvent properties like liquid hydrocarbons is developed against the above backdrop. Initial trials have shown a lot of promise.

(Source : Colourage)

## **Conference of the International Textile and Apparel Association**

The International Textile and Apparel Association (ITAA) will, hold, in co-operation with the 'Universite de la Mode', a conference in Lyon, France, from July 10-12, 1997.

The theme of the conference will be "Confluences: fashioning international perspectives". The event will gather participants from more than 20 European, Asian and American countries. The three-day meet will tackle many topics including :

- innovations in textile materials
- new technologies

- globalisation
- fashion marketing
- consumer's behaviour
- fashion communication

The ITAA is a non-profit educational and scientific society and gathers the industry, govt. organisations and universities interested in textiles and apparel.

The Conference will be a truly international event and comes at an ideal time when it is becoming especially crucial to exchange ideas worldwide and to foster intercultural understanding and studies in textiles and clothing.



# Kannada Dictionary – Culturing Sericulture

If the ability to communicate through speech is the exclusive domain of the man, the ability to communicate in writing is the key to civilization. In a broader sense, language is nothing but a medium of communication. Learning can be pleasant and efficacious if only, the medium of communication is the people's language. Knowledge, particularly scientific one, is cumulative. The present is built upon the past and the future upon the present.

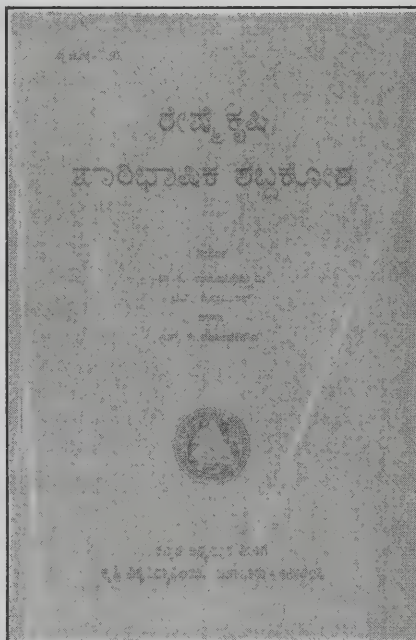
Over the years, there has been an immense increase in the volume of importance of scientific communication through vernacular languages. The communicator be him a scientist, an extension worker or a teacher must express the ideas clearly, precisely and according to the person to whom the communication is directed.

Till recently, the development of language especially in India was confined mainly to its literary aspect. But, these days, development of language as a language of science is gaining importance.

Realising the significance of learning in mother tongue, governmental and non-governmental organisations have been putting lot of efforts in this direction. The supporting literature like dictionaries, encyclo-paedia etc., are published; seminars, training programmes etc., are organised in this context. More importantly, medium of teaching is being shifted gradually to the vernacular. This is true in case of Kannada language

also. Development of Kannada as a language of science in sericulture is important mainly at two levels:

- Learning sericulture, and
- Teaching/communication



Sericulture being rural based, the local farmers who need to be communicated in their mother tongue, remain the target of an extension worker. Unless there is effective communication (now it is proved that learning through mother tongue is more cogitable), the learning will not be much effective.

A language including 'scientific' can be developed/popularised by continuous usage of the words available in that language and also by borrowing suitable words from other languages.

In this dictionary entitled "Reshme Krishi Paribhashika Shabdakosha", a similar effort is seen. The authors have not used

jargons though they showed enthusiasm of coining new words which is a welcome step. The very purpose of such literature is to make sericulture easily understood.

In Karnataka, a good number of colleges and universities are teaching sericulture in Kannada medium. Some dictionaries can be a useful reference both to the teachers and the students of Kannada medium. It further helps the sericulture extension workers and the officials to carry out their work more effectively. It would be more useful if terminologies on non-mulberry, post-cocoon technology and other important developing areas of the silk industry are also included in the forthcoming edition.

The development of science/technical books/dictionaries in Kannada and other regional languages is a welcome step as sericulture now has spread to many a new states in the country.

This 28 page dictionary is compiled by Sriyuths T.K. Narayanaswamy, R. Govindan, Dasappa and H.K. Narashimhegowda. Published by the Department of Kannada Studies of University of Agricultural Sciences, Bangalore, it is priced at Rs. 12/-

*Copies can be obtained from:*  
Department of Kannada Studies,  
University of Agricultural Sciences,  
G.K.V.K., Bangalore-560 065.

**Mukund V. Kirsur, Indian Silk,  
Central Silk Board, Bangalore.**

# Textile Trade Fairs – 1997

Date	Exhibition	Place
1997 Dec 19-21	<b>INDIA</b> <b>TEXINDIA '97</b> (South India's Major Exhibition for the Textile Industry) Venue : SSM Institute of Textile Technology Campus, Kumarapalayam, Tamil Nadu Contact : Expoeon International 126/A, Dhuruwadi, A.V. Nagwekar Marg, Prabhadevi, Mumbai – 400 025 Ph : 430 9318/6319/9610 Fax: 91-22-4300601	Kumarapalayam Tamil Nadu
1997 Aug 01-03	<b>OVERSEAS</b> <b>HERREN MODE-WOCHE</b> Casualwear and Young fashionwear Contact : Indo-German Chamber of Commerce, Mumbai Ph : 022-2186131 Fax: 022-2180523	Cologne Germany
01-03	<b>MEN'S FASHION WEEK</b> Mens fashion, suitings, jackets, sports and leisure wear Contact : Indo-German Chamber of Commerce, Mumbai Ph : 022-2186131 Fax: 022-2180523	Cologne Germany
03-05	<b>IGEDO DESSOUS WITH BODY + MAN</b> Mens and womens bodywear, beachwear, lingerie Contact : Indo-German Chamber of Commerce, Mumbai Ph : 022-2186131 Fax: 022-2180523	Dusseldorf Germany
03-06	<b>COLLECTION PREMIEREN DUSSELDORF (CPD)</b> Ladieswear, casualwear, knitwear, accessories Venue : Messegelände Contact : Indo-German Chamber of Commerce, Mumbai Ph : 022-2186131 Fax: 022-2180523	Dusseldorf Germany
08-10	<b>KIND + JUGEND</b> Baby to teenager clothing and accessories Venue : Messegelände Contact : Indo-German Chamber of Commerce, Mumbai Ph : 022-2186131 Fax: 022-2180523	Cologne Germany

Date	Exhibition	Place
09-11	<b>LEIPZIG FASHION FAIR</b> Womens, mens and childrens fashions, casualwear, jeans, sportswear and underwear Contact : Leipziger Messe Gmbh D-04007 Leipzig Ph : 49-341-6788111 Fax : 49-341-6788292	Leipzig Germany
10-12	<b>AVENIDA MODA</b> Ladies, mens and childrens shoes and fashion – undergarments, swimwear and accessories Venue : Coconut Grove Trade Fair Centre Contact : Dusseldorf Trade Shows Inc. IL60601 Chicago Ph : 1-212-3560400 Fax : 1-212-3560404	Miami U.S.A.
13-16	<b>GARMENTEC</b> Garment and textile machinery Contact : Business and Indl.Trade Fair Sdn Bhd 50400 Kuala Lumpur Ph : 60-3-4420468 Fax : 60-3-4413137	Kuala Lumpur Malaysia
17-19	<b>PREMIER COLLECTIONS</b> Womens and childrens fashion, sportswear Contact : Blein-Heim Premiere Ltd. Ph : 44-171-3233302 Fax: 44-171-6311722	Birmingham U.K.
17-19	<b>COPENHAGEN INTERNATIONAL FASHION FAIR</b> Mens, womens and children young fashion ready to wear and accessories Contact : Danish Textile and Clothing Industries DK-7400, Herning Ph : 45-97-277200 Fax : 45-97-122350	Copenhagen Denmark
19-21	<b>YARN FAIR INTERNATIONAL AND CAD EXPO</b> Contact : National Knitwear & Sportswear Asso. New York, NY 10016 Ph : 1-212-6837520 Fax : 1-212-5320766	New York U.S.A.
25-28	<b>M.A.G.I.C.</b> Menswear Venue : Convention Center Contact : Magic International California Ph : 1-310-3937757 Fax : 1-310-3938525	Las Vegas U.S.A.



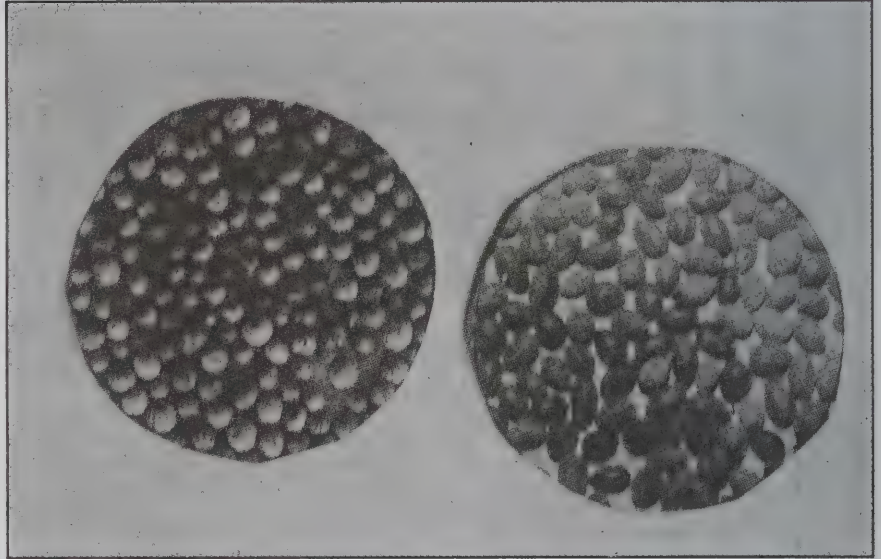
# Trade Enquiries

Sl. No.	Importers	Interested in
1.	Textilwerkstatt Wormlitzer Strasse 06110 Halle/Saale, Germany Tel : 0345-7700254	Dupion embroidery/ checks and scarves
2.	Mr. Enrique Vera Ribbon Line, Consell de Cent, 329-08009 Barcelona, Spain Fax : 9-34881269	Silk Bridal Wear
3.	S.G.P. Inc., 9828, Hollow Glen, Silver Springs, MD-20910, USA Fax : 301-585-7494	Silk fabrics of all types
4.	Pitsa Krokos Sa. 103 Giannitson street 54628 Thessaloniki, Greece Tel : 031-517653 Fax : 531433	Readymade Garments
5.	H. Lubelski-Boksenbaum Bourcet street 25, 2600 Berchem, Antwerp, Luxembourg, Belgium Fax : 32-3-2392626	Silk
6.	Eva Mantero Textiles Eva Mantero, Rep. Tessilli, V. le Montegrappa 220/H, 50047, Prato, Italy Fax : 0039-574-583315	Silk dupion and silk jacquard fabrics
7.	Will Kuypers ESPRIT le Corp GmbH, Vogelsanger Weg 49 40436 Dusseldorf, Germany Fax : 02116106-1-47	Light weight silk fabrics, CDC, jacquard knits, tafetta, tabby etc
8.	M/s. Sidco Addis Ababa, Ethiopia Tel : 251-1-712648 Fax : 251-1-710491/712400	Textile Fabrics & Yarn
9.	MLX nv, Heidebergenpark 16 B-9830 Sint-Martens- Latem, Belgium Fax : 329 2828391	Silk Durries/Carpets, Heavy Jacquards, Home furnishings, fabrics for clothing, scarves with or without embroidery/sequin work
10.	M/s. Rohi Ashi and Sons International P.O.Box 20227, Amman - 11118, Jordan Tel : 00-962-6-607076 Fax : 635973	Textiles

# मूगा भोज्य पौधों के बीजों का एकत्रीकरण एवं संरक्षण

राजाराम

**मू**गा रेशमकीट के मुख्य भोज्य पौधे हैं, सोम (मेचिलस बोम्बेसाइना), सुआलू (लिटसेइया पोलीऐन्था), डिगलोटी (लिटसेइया सेलीसीफोलिया) तथा गनसराई (सिनेमोमम ग्लेयूसेसेन्स)। ये सभी पौधे समशीतोष्ण कटिबन्ध क्षेत्र में पाये जाते हैं जिनका विस्तार मुख्य रूप से उपहिमालय के पर्वतीय क्षेत्र में है। गनसराई के अतिरिक्त अन्य सभी पौधे सदाबहार हैं। मात्र डिगलोटी ही झाड़ीदार पौधा है जिसकी ऊँचाई 3-4 मीटर तक होती है जबकि अन्य सभी, वृक्ष हैं जिनकी ऊँचाई 15-20 मीटर से भी अधिक हो जाती है।



मूगा भोज्य पौधों के बीज

**मूगा रेशम हैतु भोज्य पौधों के सफल रोपण की एक पूर्वापेक्षा है, बीजों की अंकुरण क्षमता जिसका सीधा संबंध बीजों के चयन हेतु उपयुक्त काल व विधि के साथ-साथ रोपण तक उनके संरक्षण से है।**

डिगलोटी का पौधा चाकी कीटपालन के लिये बहुत उपयोगी है क्योंकि इसकी ऊँचाई कम होने के कारण इसे नाइलोन की जाली से आसानी से ढका जा सकता है। शहतूत की भांति इसकी कटाई-छंटाई एवं रखरखाव से न सिर्फ गुणयुक्त पत्तियाँ ही प्राप्त होती हैं वरन् नाशक कीटों तथा पक्षियों आदि से भी रेशमकीटों का आसानी से बचाव किया जा सकता है। मूगा भोज्य पौधों के बीज अलग-अलग समय पर पकते हैं जिनकी अंकुरण की क्षमता भूमि पर गिर जाने से कम हो जाती है। यदि इन बीजों को पकने पर पौधों से ही एकत्रित कर लिया जाए तो, गनसराई

को छोड़ कर अन्य पौधों के बीजों में प्रारम्भिक अंकुरण क्षमता 80-95 प्रतिशत तक होती है। इन बीजों को खुले में रखने से, इनमें नमी की कमी हो जाने के कारण अंकुरण क्षमता धीरे-धीरे समाप्त हो जाती है। बीजों को वायुरिक्त पोलिथिन के थैलों में रखने से अंकुरण क्षमता में होनेवाली कमी से आसानी से बचा जा सकता है तथा बीजों को कई वर्षों तक सुरक्षित रखा जा सकता है।

## बीजों का एकत्रीकरण

मूगा भोज्य पौधों के बीज विभिन्न मौसमों में पकते हैं, सोम अप्रैल-मई, सुआलू तथा डिगलोटी मई-जून तथा गनसराई सितम्बर-अक्टूबर में। पकने पर बीज जामुनी रंग के हो जाते हैं; सोम, सुआलू तथा डिगलोटी के बीजों/फलों का रंग हरा-बैंगनी तथा गनसराई के बीजों/फलों का रंग हल्का गुलाबी-बैंगनी होने पर इन्हें पूर्ण रूप से पके बीजों/फलों के साथ तोड़ कर, कुछ ताजी पत्तियों के साथ पोलिथिन के थैलों में एकत्रित करना चाहिये। तत्पश्चात्, पोलिथिन का मुंह बांध



कर 2-3 दिन तक रख देना चाहिये क्योंकि बीज के छिलके को एकत्रित करने के तुरन्त बाद आसानी से नहीं हटाया जा सकता है। पोलीथिन में ताजी पत्तियाँ साथ रखने से छिलका मुलायम हो जाता है और आसानी से साफ हो जाता है। साथ ही, इस प्रकार एक बार अधिक मात्रा में बीज एकत्रित किये जा सकते हैं।

## बीजों की सफाई

पोलीथिन में एकत्रित बीजों को हाथ से हल्के-हल्के रगड़ना चाहिये जिससे इनके ऊपर का छिलका तथा गूदा आसानी से निकल जाए। पोलीथिन से बीज बाहर निकाल कर पानी के बहाव से गूदा को धो देना चाहिये। बीजों को 2-3 बार रगड़ने तथा धोने से बीज पूर्ण रूप से साफ हो जाते हैं। बीजों की शुद्धता ज्ञात करने के लिये स्वच्छ जल में डालने पर ऊपर तैर रहे बीजों को हटा देना चाहिये क्योंकि उनमें विभिन्न कारणों से अंकुरण क्षमता का अभाव होता है। तल में बैठ गये उपयुक्त बीजों को निकाल लेना चाहिये, तथा छाया में 3-4 घंटे तक सुखाना चाहिये। हरे रंग के बीजों की अंकुरण क्षमता कम होती है जिन्हें अलग कर लेना चाहिये।

## बीजों का उपचार

संरक्षण से पूर्व फफूंदीनाशक दवा से बीजों का उपचार करना चाहिये, क्योंकि बीजों के संरक्षण में फफूंदी लगने की सम्भावना रहती है जिससे उनकी अंकुरण क्षमता समाप्त हो



मूगा भोज्य पौधों के बीज

सकती है। फफूंदी लगने से बचाने के लिये बेविस्टीन से 100 मि. ग्राम प्रति 100 ग्राम बीजों का उपचार करना चाहिये। बीजों के साथ वेविस्टीन ठीक ढंग से मिलाना चाहिये जिससे यह बीजों के चारों तरफ लग जाए और फफूंदी लगने की संभावना पूर्णरूपेण समाप्त हो जाए।

## बीजों की गठरी बांधना

फफूंदीनाशक से उपचार के पश्चात् बीजों को पोलीथिन के साफ थैलों में भरना चाहिये। तदुपरान्त पोलीथिन का मुँह इस प्रकार बन्द करना चाहिये जिससे पोलीथिन के अन्दर बीजों के साथ हवा न रहे तथा न ही बाहर से अन्दर जा सके। बीजों को एल्यूमीनियम के महीन पत्तर के थैलों में भी बन्द करके रखा जा सकता है।

## गठरियों की सुरक्षा

बीज भरी गठरियों को कमरे के तापमान 18° से 35° सेग्रे. तथा आर्द्रता 58 से 85 प्रतिशत के बीच रखा जा सकता है। गठरियों को कीटों तथा चूहों आदि से बचाना अति आवश्यक है क्योंकि पोलीथिन में किसी प्रकार से छिद्र हो जाने पर पोलीथिन के अन्दर हवा जाने से बीजों की नमी में कमी हो जायेगी और अंकुरण क्षमता समाप्त हो सकती है। एक छोटा-सा भी कीट या फफूंदी का बीजाणु पोलीथिन के अन्दर चला जाए तो वह बीजों को नष्ट कर देगा जिससे अंकुरण क्षमता कम अथवा पूर्ण रूप से नष्ट हो जायेगी। अतः, बीज भरे थैलों में छिद्र होने से बचाना अति आवश्यक है।

(शेष पृष्ठ 53 पर)

तालिका : मूगा भोज्य पौधों के बीजों की अंकुरण-क्षमता				
संरक्षण समय (महीने)	अंकुरण-क्षमता प्रतिशत			
	सोम	सुआलू	डिगलोटी	गनसराई
प्रारम्भिक	85.00	79.00	85.75	65.00
3	78.00	73.00	81.75	30.00
6	74.50	68.00	78.00	10.00
9	72.00	-	76.25	-
12	70.00	-	70.00	-
45	60.00	-	-	-

# रेशमी गोटे : एक परम्परा

सत्यभान सारस्वत एवं मनोजा पटनायक

रेशमी साड़ियों के सौंदर्य में अभिवृद्धि हेतु प्राचीन काल से विशिष्ट अवसरों पर प्रयुक्त गोटे लगी साड़ियाँ उपयोग के बाद भले ही नष्ट हो जाएं, गोटों का प्रयोग पुनः किया जा सकता है। यद्यपि गोटे का इतिहास अपेक्षाकृत प्राचीन है किन्तु भारत में सर्वप्रथम इसका उल्लेख वर्ष 1880 में “दी आर्ट ऑफ इण्डिया” नामक पुस्तक में पाया गया है। इस पुस्तक के अनुसार मार्कोपोलो ने भारत में बुने लेस (गोटे) का वर्णन किया है। मार्कोपोलो ने वर्ष 1288 के दौरान भारत-भ्रमण के पश्चात् भारत

**रेशमी साड़ियों में लगे सोने-चाँदी के गोटे से न सिर्फ साड़ी वरन् नारी के सौंदर्य में भी अतुलनीय अभिवृद्धि होती रही है। किन्तु, आज इस उद्योग को उपभोक्ताओं के साथ अन्य अभिकरणों से प्रोत्साहन की भी अपेक्षा है।**

में गोटे का उल्लेख अपनी पुस्तक “लेस इंडस्ट्री” में किया है। कालान्तर में, अकबर के शासन-काल में गोटे के व्यापार को बहुत प्रोत्साहन दिया गया। इसके अतिरिक्त, यूसुफ अली रचित एक अन्य पुस्तक “सिल्क फेब्रिक ऑफ इण्डिया” में गोटे का वर्णन प्राप्त होता है।

## प्रमुख व्यापार केन्द्र

राजस्थान व गुजरात में गोटे का व्यापार पुराने समय से हो रहा है। राजस्थान में सीकर जिले के खन्डेला व गुजरात के सूरत में गोटा निर्माण को कुटीर उद्योग के रूप में अपनाया गया है। खन्डेला में गोटा बुनाई हेतु अधिकांश जरी सूरत से मंगाई जाती है। बताया जाता है कि जयपुर के संस्थापक महाराजा सवाई जयसिंह ने सूरत से जरी के कारीगरों को बुलाकर राजस्थान में गोटे का निर्माण कार्य प्रारम्भ करवाया था।

## रेशमी वस्त्रों में गोटे

आजादी से पूर्व तथा थोड़े समय बाद तक गोटे में शुद्ध

सोने का प्रयोग होता था किन्तु, सोने के मूल्य में वृद्धि के साथ-साथ गोटे में सोने का उपयोग कम होता गया। अब धीरे-धीरे तांबे, स्टील व कृत्रिम गोटे का निर्माण होने लगा है। पहले बनारसी रेशमी साड़ी में किनारे पर सोने के तारों से बना गोटा लगता था जो बाद में चांदी का लगने लगा।

## विविध प्रकार एवं निर्माण

सामान्यतः लकड़ी के फ्रेम में चांदी या तांबे, स्टील आदि के सीधे तार एवं आड़े रेशम के धागे लगाकर हाथ से घुमाकर, हथ्ये पर चढ़ाकर गोटा बनाया जाता है। इसमें सबसे कम चौड़ा गोटा आठ तार का होता है जिसे अठमासा कहते हैं। इसमें चांदी के आठ तार व रेशम के दो तार होते हैं। रेशमी साड़ी के किनारे पर टांके जानेवाले इन गोटों की चौड़ाई डेढ़ से दो इंच होती है।

## लप्पा व ठप्पा गोटा

सामान्यतया गोटे की चौड़ाई 3 से 12 इंच होती है जिसे लप्पा कहते हैं जिसका प्रयोग रेशमी साड़ी के पल्लू व किनारी पर करने से सिर पर रखे साड़ी के पल्लू से मुखमंडल पर सोने के गहनों की कांति-सी फैल जाती है। तीन इंच से कम अर्थात् मात्र साड़ी की किनारी पर लगने वाले गोटे को ठप्पा कहते हैं।

## पठानी गोटा

रेशमी साड़ी के किनारे पर लगाने हेतु तैयार किए गए इस गोटे की चौड़ाई लगभग एक इंच होती है।

## चरखी गोटा

यह चांदी, सोने, तांबे के बहुत पतले तार से बनाया जाता है जिसकी कारीगरी पूरी साड़ी में की जाती है। कहीं-कहीं पर साड़ी में सितारों की तरह जड़ने में भी इसका प्रयोग होता है। गोटे के कुछ अन्य प्रकार हैं कांकड़ा, गोखरू, बीजिया, सिरयू, बीजबेल, आबलहर आदि।



## उपयोगिता

रेशम की साड़ी, अपनी प्राकृतिक कोमलता, स्वाभाविक चमकीलेपन एवं सौन्दर्य के लिए प्रसिद्ध है। किन्तु सामान्यतः महिलाएं अपने पैरों को ढकने का विशेष ध्यान रखने के कारण साड़ी को फर्श का स्पर्श करते हुए खिसकने देती हैं जिससे साड़ी के किनारे धीरे-धीरे घिसने लगते हैं। ऐसे में यदि साड़ी के किनारों को गोटे जैसा मजबूत सहारा मिल जाए तो रेशमी साड़ी की आयु में चार वर्ष और साड़ी के सौन्दर्य में चार चांद लग जाएं। रेशमी गोटे की साड़ियों का चलन अभी भी जारी

है किन्तु राज्य व केन्द्र सरकार का ध्यान गोटे उद्योग की ओर विशेष रूप से नहीं जा रहा है जिस कारण गोटा उत्पादकों की संख्या घटती जा रही है एवं गोटे के मूल्यों में अप्रत्याशित वृद्धि हो रही है। इस कुटीर उद्योग के पुनरुद्धार की ओर संबंधित विभागों का ध्यानाकर्षण इस परम्परा को जारी रखने के लिए परम आवश्यक हो गया है।

लेखकद्वय केन्द्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान, बहरमपुर (प. बंगाल) में कार्यरत हैं।

(पृष्ठ 51 से जारी)

## मूगा भोज्य पौधों के बीजों का एकत्रीकरण एवं संरक्षण

### अंकुरण क्षमता

बोने के लिए संरक्षित बीजों के थैले को खोलकर सारे बीजों का प्रयोग एक ही बार में कर लेना चाहिए। अन्यथा कुछ समय के अन्तराल पर एक थैले के बीजों का उपयोग करने से हवा के सम्पर्क से बीजों की अंकुरण क्षमता कुछ कम हो जायेगी। उपरोक्त पौधों के बीजों की अंकुरण क्षमता, उनके एकत्र करने के तुरन्त बाद तथा संरक्षण करने के तीन महीने के अन्तराल पर बालू में बोने पर सोम के बीजों की अंकुरण क्षमता प्रारम्भिक 85 प्रतिशत से घट कर 45 महीने बाद 60 प्रतिशत, सूआलू में 79 प्रतिशत से 6 महीने बाद 58 प्रतिशत, डिगलोटी में 85.75 प्रतिशत से 12 महीने बाद 70 प्रतिशत तथा गनसराई में 65 प्रतिशत से 6 महीने बाद 10 प्रतिशत रह गयी (तालिका)।

उपरोक्त विधि से मूगा भोज्य पौधों के बीजों को एकत्रित एवं संरक्षण करके रखने से बीजों की अंकुरण क्षमता को कई वर्षों तक बनाये रखा जा सकता है। बीजों को सुरक्षित करके उनकी अंकुरण क्षमता को बनाये रखने के साथ-साथ प्राकृतिक

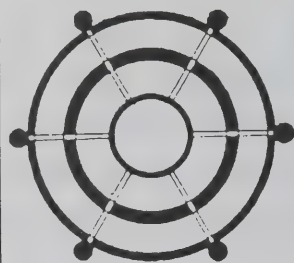
रूप से पौधे की भिन्नता को भी सुरक्षित रखा जा सकता है।

### बीज संरक्षण के लिये आवश्यक निर्देश

1. पके बीजों को सदैव पौधे से ही एकत्रित करना चाहिये।
2. बीजों की सफाई ठीक से करें।
3. बीजों की सफाई करके 3-4 घंटे छाया में सूखा कर इनका उपचार फफूंदनाशक से करें।
4. पोलीथिन थैलों को वायुरूद्ध करना चाहिये।
5. चूहे व कीटों आदि से सुरक्षा के लिए पोलीथिन थैलों को सुरक्षित स्थान पर रखना चाहिये।
6. बीजों की बोआई थैली से निकाल कर तुरन्त करनी चाहिये अथवा आवश्यकतानुसार बीज निकाल कर थैली को तुरन्त बन्द कर देना चाहिये।

लेखक केन्द्रीय तसर अनुसंधान एवं प्रशिक्षण संस्थान, अनुसंधान प्रसार केन्द्र, पालमपुर, हिमाचल प्रदेश में कार्यरत हैं।

देश में रेशम उत्पादन एवं उद्योग के किसी पहलू के संबंध क्या आप कुछ कहना चाहते हैं ? कृपया संपादक को निःसंकोच लिखें। इंडियन सिल्क में प्रकाशित लेखों पर आपकी प्रतिक्रिया के अतिरिक्त, रेशम उत्पादन के किसी भी पहलू पर आपके विचारों का स्वागत है।



# Exports Review

Foreign exchange earnings of the Indian Silk Industry during May '97 amounted to Rs. 6748.28 lakh compared to Rs. 6040.65 lakh during May '96 and registered an increase of 11.7%.

## Review of Silkgoods Certified for Exports

During May 1997 and April to May period of the year 1997-98

TABLE - I

### Export Performance of Indian Silk Industry

(Unit : Lakh ; Qty : Silkgoods ; Sq. Mtrs. ; Silkyarn/Silkwaste : Kg ; Value : Rs.)

Item of Export	May				% Increase		April to May				% Increase	
	1997		1996				1997-98		1996-97			
	Qty.	Value	Qty.	Value	Qty.	Value	Qty	Value	Qty.	Value	Qty.	Value
A. Silkgoods :												
(1) Mulberry												
(i) Dress Material	14.80	2514.28	15.63	2480.69	-5.3	1.4	30.12	5273.34	28.74	4620.06	4.8	14.1
(ii) Readymade Garments	2.50	1633.84	5.00	1037.94	-50.0	57.4	4.89	2227.40	9.58	2074.61	-49.0	7.4
(iii) Carpets	0.09	786.13	0.07	595.18	28.6	32.1	0.15	1421.46	0.16	1373.29	-6.3	3.5
(iv) Sarees	3.22	581.30	3.53	591.20	-8.8	-1.7	5.07	957.48	6.50	1111.12	-22.0	-13.8
(v) Scarves/stoles	5.02	417.47	5.41	496.37	-7.2	-15.9	9.11	839.84	11.22	1030.35	-18.8	-18.5
(vi) Others	1.90	444.15	3.32	454.91	-42.8	-2.4	3.84	929.58	5.84	849.69	-34.2	9.4
Mulberry Total [i to vi]	27.53	6377.17	32.96	5656.29	-16.5	12.7	53.18	11649.10	62.04	11059.12	-14.3	5.3
(2) Tasar	0.57	85.98	1.04	168.19	-45.2	-48.9	1.47	218.49	2.13	363.56	-31.0	-39.9
Total [1+2]@	28.10	6463.15	34.00	5824.48	-17.4	11.0	54.65	11867.59	64.17	11422.68	-14.8	3.9
(3) Mixed/Blended	1.66	237.28	1.91	203.27	-13.1	16.7	3.29	438.35	3.66	369.96	-10.1	18.5
Total [1+2+3]	29.76	6700.43	35.91	6027.75	-17.1	11.2	57.94	12305.94	67.83	11792.64	-14.6	4.4
B. SILKYARN	-	-	0.01	6.92			-	-	0.02	15.93		
C. SILKWASTE	0.30	47.85	0.04	5.98			0.48	78.26	0.04	5.98		
TOTAL [A+B+C]		6748.28		6040.65		11.7		12384.20		11814.55		4.8
@ Refers to total natural silk goods exports.												

@ Refers to total natural silk goods exports.

During April to May '97, foreign exchange earnings from silk goods certified for exports amounted to Rs. 12384.20 lakh as against Rs. 11814.55 lakh during the corresponding period of previous year and reflected an

increase of 4.8%.

Data on itemwise silkgoods certified for exports are given in Table - I.

Comparative data on region-wise silkgoods certified for exports are given in Table-II.

### Natural silkgoods

During May '97, the natural silkgoods certified for exports amounted to 28.10 lakh sq. mtrs valued at Rs. 6463.15 lakh as against 34.00 lakh sq. mtrs. valued at Rs. 5824.48 lakh

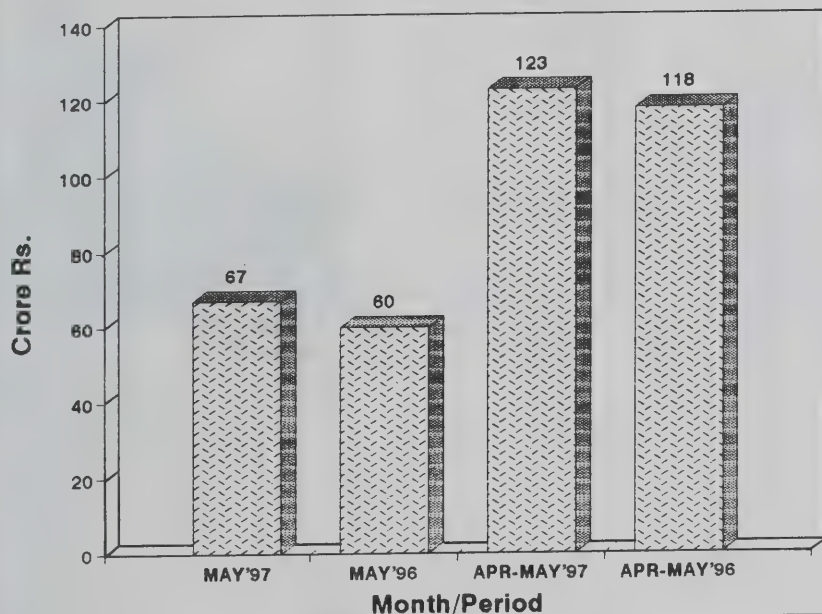


**Table - II**  
**Regionwise Silkgoods certified for exports**

[Unit:Lakh;Qty:Sq.mtrs;Value:Rs.]

Region	May						April-May					
	1997		1996		% Increase		1997-98		1996-97		% Increase	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
West Europe	13.04	2680.42	14.72	2594.31	-11.4	3.3	25.96	5260.75	29.67	5322.53	-12.5	-1.2
USA & Others	8.93	2815.95	12.15	2288.98	-26.5	23.0	17.21	4752.16	22.04	4276.05	-21.9	11.1
Asia	6.00	866.54	6.95	796.62	-13.7	8.8	11.87	1698.10	12.93	1613.05	-8.2	5.3
Japan & Others	0.71	164.27	0.58	127.26	22.4	29.1	1.15	272.17	1.20	251.20	-4.2	8.3
Africa	0.62	134.09	1.20	194.50	-48.3	-31.1	0.90	215.46	1.53	274.53	-41.2	-21.5
East Europe	0.46	39.16	0.31	26.08	48.4	50.2	0.85	107.30	0.46	55.28	84.8	94.1
Total	29.76	6700.43	35.91	6027.75	-17.1	11.2	57.94	12305.94	67.83	11792.64	-14.6	4.4

**Silk Export Earnings**



during the corresponding month of previous year and though recorded a decrease of 17.4% in quantity, showed an increase of 11% in value.

During April to May '97 period of 1997-98, the aggregate natural silk goods certified for exports amounted to 54.65 lakh sq. mtrs valued at Rs. 11867.59 lakh as against 64.17 lakh sq. mtrs. valued at Rs. 11422.68 lakh during the corresponding period of preceding year.

### **Mulberry silkgoods**

During May '97, mulberry silkgoods certified for exports amounted to 27.53 lakh sq.mtrs valued at Rs. 6377.17 lakh as against 32.96 lakh sq. mtrs. valued at Rs. 5656.29 lakh during May '96. Though it showed an decrease of 16.5% in quantity, recorded an increase of 12.7% in value.

During the April to May '97, mulberry silkgoods certified for exports amounted to 53.18 lakh sq. mtrs. valued at Rs. 11649.10

lakh compared with 62.04 lakh sq. mtrs. valued at Rs. 11059.12 lakh during the corresponding period of 1996-97. In spite of slump in quantum exports, it showed an increase of 5.3% in value. Out of the total natural silkgoods certified for exports, the share of mulberry silkgoods roughly amounted to 97% in quantity and 98% in value.

Countrywise data of mulberry silkgoods certified for exports is given in Table - III.

### **Varietywise mulberry silkgoods**

During April to May '97 period of the year 1997-98, among the various varieties of mulberry silk goods certified for exports, dress materials ranked first followed by readymade garments, carpets, sarees and scarves/stoles. Table-1 also includes data of varietywise mulberry silkgoods certified for exports.

### **Tasar silkgoods**

During May '97, tasar silkgoods certified for exports amounted to 0.57 lakh sq.mtrs valued at Rs. 85.98 lakh compared with 1.04 lakh sq.mtrs valued at Rs. 168.19 lakh during May '96 and registered a perceptible

**Table - III**  
**Foreign Exchange Earnings from Mulberry Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	May		%	April to May		%	Country Share Percentage in	
	1997	1996		1997	1996		1997	1996
U.S.A.	2519.95	1892.13	33.2	4126.66	3496.96	18.0	35.4	31.6
Germany	1112.23	1041.74	6.8	1861.79	1937.93	-3.9	16.0	17.5
U. K.	604.68	583.99	3.5	1277.17	1209.03	5.6	11.0	10.9
France	221.08	211.32	4.6	555.88	497.82	11.7	4.8	4.5
U.A.E.	195.56	159.20	22.8	464.10	405.45	14.5	4.0	3.7
Canada	188.08	222.56	-15.5	330.64	432.91	-23.6	2.8	3.9
Italy	211.29	182.95	15.5	329.06	352.39	-6.6	2.8	3.2
Hong Kong	118.29	87.97	34.5	258.74	210.37	23.0	2.2	1.9
Netherlands	118.14	116.67	1.3	251.30	240.10	4.7	2.2	2.2
Singapore	130.56	108.37	20.5	178.74	200.15	-10.7	1.5	1.8
Australia	95.45	78.54	21.5	163.73	138.75	18.0	1.4	1.3
Switzerland	63.83	75.27	-15.2	137.07	210.17	-34.8	1.2	1.9
Portugal	43.04	58.69	-26.7	119.68	84.17	42.2	1.0	0.8
Austria	28.19	28.69	-1.7	110.96	97.99	13.2	1.0	0.9
Denmark	38.05	48.83	-22.1	103.11	93.38	10.4	0.9	0.8
Spain	35.42	60.51	-41.5	102.18	113.90	-10.3	0.9	1.0
Brazil	21.15	26.24	-19.4	83.59	37.38	123.6	0.7	0.3
Belgium	30.93	30.28	2.1	81.52	116.54	-30.0	0.7	1.1
Thailand	36.72	19.18	91.4	81.41	29.17	179.1	0.7	0.3
Turkey	26.42	14.26	85.3	78.53	21.45	266.1	0.7	0.2
Others	538.11	608.90	-11.6	953.24	1133.11	-15.9	8.2	10.2
Total	6377.17	5656.29	12.7	11649.10	11059.12	5.3	100.0	100.0

@ Refers to top 20 importing countries

**Table - IV**  
**Foreign Exchange Earnings from Tasar Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	May		%	April to May		%	Country Share Percentage in	
	1997	1996		1997	1996		1997	1996
Germany	16.81	31.62	-46.8	44.74	68.60	-34.8	20.5	18.9
U.S.A.	7.04	39.15	-82.0	30.15	85.57	-64.8	13.8	23.5
Brazil	13.62	1.89	620.6	19.35	3.73	418.8	8.9	1.0
Hong Kong	8.83	0.46	1819.6	15.08	0.46	3178.3	6.9	0.1
Turkey	3.42	-	-	14.30	0.90	1488.9	6.5	0.2
U.A.E.	1.38	14.80	-90.7	13.64	42.76	-68.1	6.2	11.8
Saudi Arabia	0.35	0.53	-34.0	11.33	4.19	170.4	5.2	1.2
Colombia	9.60	-	-	9.60	-	-	4.4	0.0
Belgium	3.18	1.91	66.5	8.40	2.01	317.9	3.8	0.6
Chile	0.10	2.80	-96.4	6.85	4.29	59.7	3.1	1.2
South Africa	2.94	2.12	38.7	6.47	5.58	15.9	3.0	1.5
U.K.	1.71	2.90	-41.0	5.54	26.15	-78.8	2.5	7.2
Italy	5.19	1.51	243.7	5.19	4.11	26.3	2.4	1.1
France	0.45	6.31	-92.9	5.03	11.14	-54.8	2.3	3.1
Japan	2.23	0.94	137.2	4.84	4.50	7.6	2.2	1.2
Canada	1.93	9.06	-78.7	4.11	16.17	-74.6	1.9	4.4
Switzerland	-	0.30	-100.0	3.51	0.67	423.9	1.6	0.2
Kuwait	2.42	1.54	57.1	2.42	9.64	-74.9	1.1	2.7
Spain	1.52	1.03	47.6	1.78	6.68	-73.4	0.8	1.8
Qatar	1.58	-	-	1.58	-	-	0.7	0.0
Others	1.68	49.32	-96.6	4.58	66.41	-93.1	2.1	18.3
Total	85.98	168.19	-48.9	218.49	363.56	-39.9	100.0	100.0

@ Refers to top 20 importing countries

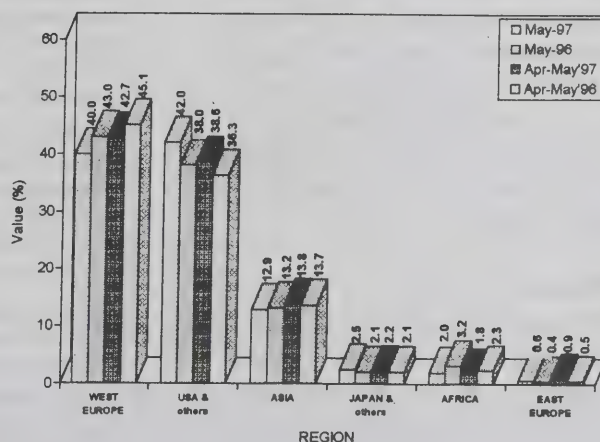
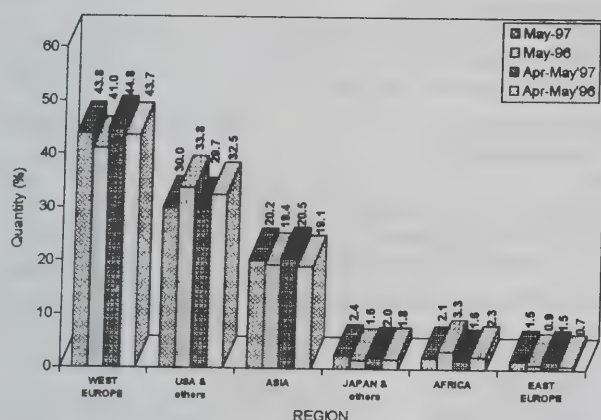


**Table V**  
**Unit Export Price**

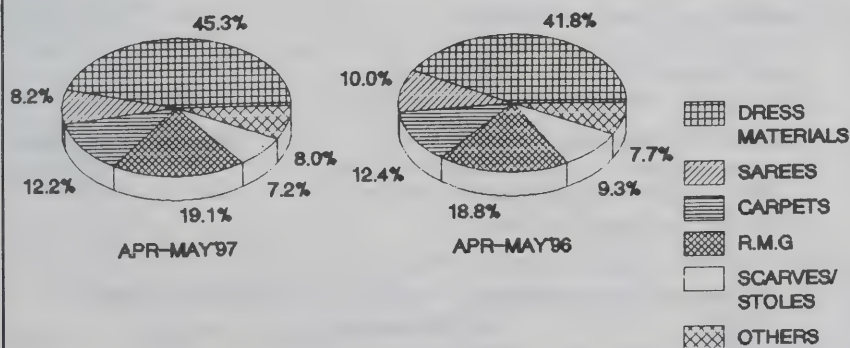
(Rs. per Sq.mtr.)

Item	May			April-May		
	1997	1996	% Increase	1997	1996	% Increase
A. Mulberry Silkgoods						
1. Excl. Carpets	203.76	153.89	32.4	192.87	156.54	23.2
2. Incl. Carpets	231.64	171.61	35.0	219.05	178.26	22.9
3. Carpets	8734.78	8120.93	7.6	9476.40	8351.29	13.5
B. Tasar Silkgoods	150.84	161.37	-6.5	148.63	170.59	-12.9

### REGION-WISE SILKGOODS CERTIFIED FOR EXPORTS



### Share percentage of Varietywise Mulberry Silkgoods Export Earnings



decline of 45.2% in quantity and 48.9% in value.

During April to May '97 period of the year 1997-98, a total quantity of 1.47 lakh sq. mtrs of tasar silkgoods valued at Rs. 218.49 lakh was certified for exports as against 2.13 lakh sq. mtrs. valued at Rs. 363.56 lakh during the corresponding period of previous year and registered a substantial decrease of 31% in quantity and 39.9% in value.

Countrywise data of tasar silkgoods certified for exports are given in Table-IV.

#### Unit export price

The unit export price realised for mulberry and tasar silkgoods

during May '97 and April to May '97 period of the year 1997-98 along with comparative data of previous year are given in Table-V.

### Mixed or blended silkgoods

During May '97, mixed/blended silkgoods certified for exports amounted to 1.66 lakh sq.mtrs valued at Rs. 237.28 lakh compared with 1.91 lakh sq. mtrs. valued at Rs. 203.27 lakh during May '96 and showed an increase of 16.7% in value.

Mixed/blended silkgoods certified for exports during April to May '97 period of the year 1997-98 amounted to 3.29 lakh sq.mtrs valued at Rs. 438.35 lakh compared with 3.66 lakh sq. mtrs valued at Rs. 369.96 lakh in the corresponding period of previous year and reflected an increase of 18.5% in value.

### Silkwaste

Silkwaste and its bye-products certified for exports during April to May '97 period of the year 1997-98 amounted to 48 ton valued at Rs. 78.26 lakh as against 4 ton valued at Rs. 5.98 lakh in the corresponding period of previous year.

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# Silk Prices

May 1997

## Raw Silk : Volume of Transaction

At all the silk exchanges in Karnataka, a total quantity of 168.084 tons of all qualities of raw silk valued at Rs.1651.650 lakh was transacted during May '97 as against a quantity of 109.980 tons valued at Rs. 1216.969 lakh during May '96.

At Bangalore Silk Exchange alone, which is the largest exchange, a total quantity of 145.816 tons of all qualities of rawsilk viz. filature/cottage basin, charka and dupion, valued at Rs. 1382.882 lakh was transacted during May '97 as compared to 91.737 tons valued at Rs. 987.446 lakh during May '96. The volume of transaction at Bangalore Silk Exchange alone accounted for 86.8% in quantity and 83.7% in value of the silk transacted at all the exchanges in Karnataka.

Data on qualitywise transaction of rawsilk at Bangalore silk exchange vis-a-vis at all the silk exchanges in Karnataka during May '97 and

**Table I. Transaction of Raw Silk at Bangalore Silk Exchange**

(Qty. : Tonnes, Value : Lakh Rs.)

Raw Silk Quality	May '97		May '96	
	Quantity	Value	Quantity	Value
Filature/Cottage Basin	23.688 (36.935)*	299.832 (473.469)	17.85 (29.662)	235.337 (389.123)
Charka	93.624 (102.098)	908.814 (999.148)	57.880 (64.270)	640.598 (716.005)
Dupion	28.504 (29.051)	174.236 (179.033)	16.007 (16.048)	111.511 (111.841)
Total	145.816 (168.084)	1382.882 (1651.650)	91.737 (109.980)	987.446 (1216.969)

+ Figures in brackets refers to total transaction at all the Silk Exchanges in Karnataka.

**Table II. Transaction of raw silk of different deniers of Filature raw silk at Bangalore Silk Exchange during May '97**

Denier		Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
				Min.	Max.	Avg.
13/15	Fine	84	107200	1250	1300	1276
14/16	Fine	2222	2786640	1200	1400	1254
16/18	Fine	7694	9482119	1140	1560	1232
18/20	Medium	5153	6426961	943	1560	1247
20/22	Medium	5086	6633498	700	1560	1304
22/24	Medium	489	579968	1000	1300	1187
24/26	Medium	401	451563	1030	1250	1127
26/28	Coarse	1408	1982673	1060	1575	1408
28/30	Coarse	291	347039	905	1320	1193
30/32	Coarse	860	1164637	1080	1450	1354
Total		23688	29962298	700	1575	1266

May '96 are given in Table-I. The transactions of rawsilk of different deniers of filature rawsilk at Bangalore Silk Exchange during May '97 is given in Table-II.

**Table III. Prices of Indigenous Silk**

(Rs./Kg)							
Silk Exchange	Variety	May '97			May '96		
		Min	Max	Avg	Min	Max	Avg
Bangalore Silk Exchange (Karnataka)	Filature/Cottage Basin	700	1575	1266	400	1525	1320
	Charka	575	1440	971	700	1400	1107
	Dupion	111	920	611	265	866	696
Anna Silk Exchange, Kanchipuram Market (Tamil Nadu)	Filature/Cottage Basin	1125	1320	1117	1075	1240	945
	Charka	800	1025	945	860	1110	972

**Table IV. Imported Silk (Varanasi Market)**

(Rs./Kg)				
Filature Silk 20/22 Dr	May '97		May '96	
	Min	Max	Min	Max
Chinese	1350	1500	1125	1350
Korean	1380	1575	860	1045

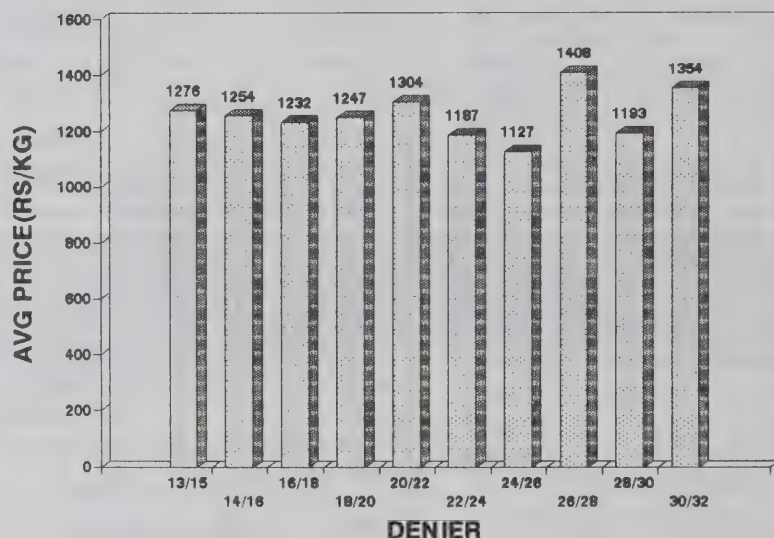
## Prices of Sericultural Commodities

The prices of different qualities of indigenous rawsilk at Bangalore silk exchange (Karnataka) and Anna Silk Exchange (Tamilnadu) besides prices of imported rawsilk at Varanasi market, during May '97 in comparison with May '96 are given in Table - III & IV.

Also the prices of different varieties of mulberry reeling cocoons quoted at important cocoon markets of Karnataka, Tamilnadu and Andhra Pradesh are given in Table V.

Compiled by  
Statistical Section, CSB

**Average Prices of Denierwise Filature Rawsilk Transacted at Silk Exchange**

**Table V. Mulberry Reeling Cocoon Prices**

(Rs./kg.)						
State	Market	Variety	May '97		May '96	
			Min	Max	Min	Max
Karnataka	Ramanagaram	Imp. cross breed	75.00	143.00	87.00	175.00
	T. Narasipur	Ord. cross breed	34.00	80.00	36.60	98.00
Tamil Nadu	Vaniyambadi	Imp. cross breed	49.20	125.20	70.00	133.00
	Coimbatore	Imp. cross breed	70.20	122.80	64.00	135.00
Andhra Pradesh	Hyderabad	Multivoltine	40.00	125.00	32.35	138.50
	Dharmavaram	Multivoltine	61.00	141.00	36.00	150.00





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# Indian Silk

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The complete sericulture and silk industry journal of India  
JULY 1997



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# Non-mulberry: Tapping the Potential

**T**hough the mulberry silk constitutes the major portion of the total silk production in the country, the non-mulberry sector plays a key role in providing gainful employment to more than seven lakh persons in the tribal areas and also to other underprivileged sections of the society. Unlike mulberry silkworm reared under utmost care, non-mulberry silkworms are grown in nature.

At present, India produces 231, 861 and 74 M.T. of tasar, eri and muga silks, respectively with a bright prospect for development. In the initial years, thrust was given on different developmental aspects. It followed the establishment of exclusive institutes by the Central Silk Board for different non-mulberry silks for carrying out research and extension activities. Raw material banks for stabilising the silk prices were also set up.

However, unlike mulberry, the process of overall development could not keep pace resulting in the reduced productivity. The reasons for this are many; low productivity because of stray plantation, inadequate seed support and multiplication infrastructure, dearth of appropriate technologies especially in the post-cocoon sector and marketing facilities. Abandoning of the avocation by the new generation of the tribals in view of other lucrative occupations added to the problem.

In view of this, suitable measures have been taken up under different schemes. For further improvement, rejuvenation/ plantation programmes have been formulated besides evolution of more number of domesticated eco-races, propagation of the food plants under social-forestry programmes as well as extending the usufruct right of plantation to tribals to augment systematic plantation. Strengthened and effective extension network, training facilities, popularisation of improved post-cocoon technologies including recently evolved low-cost reeling and spinning devices and adoption of co-operatives & societies are some other areas focused for making this avocation more attractive.

Better marketing strategies are essentially required to minimise the exploitation of the cocoon producers and to ensure this, the Board has implemented different schemes like organisation of marketing of cocoons by bidding and rolling credit support for small reelers and weavers. The development of the non-mulberry products and their diversification would lead to enhanced domestic and export markets.

All said and done, there lies a vast scope for making the non-mulberry sector a viable venture, thereby bringing about an economic upliftment of the rural populace, especially the tribals, in the years to come.

 **Editor**

## Popularizing tank silt

The article "Irrigation and Summer Management of Mulberry Garden" (**Indian Silk**, May 1997) by Dr. R.K. Mishra *et al.* is quite informative, suggesting techniques of irrigation management and water conservation. The article emphasizes on providing irrigation just equivalent to field capacity but does not indicate, how to calculate the amount of water required for one acre of sandy loam land for irrigation to the field capacity.

The article also suggests to apply large amounts of organic matter to increase the water holding capacity of land but now-a-days, due to lack of proper mobilization and also high price of the organic manure, farmers are not able to provide it in sufficient quantity and therefore, it has become more appropriate to apply tank silt wherever available to improve the soil texture and water holding capacity of the field.

**Pradeep Shukla**

Senior Research Assistant  
Sericulture Training School,  
SSPC, CSB, Deksara, Kishanganj,  
Bihar - 855 107.

## We're also there!

This refers to the article "Soil Sampling : Why, how and where" by Mukund V. Kirsur (**Indian Silk**, May 1997). The article gives exhaustive list of soil testing laboratories under private and government sectors in Southern India. However, Karnataka State Sericulture Research and Development Institute (KSSRDI), Thalaghattapura, Bangalore is missing out.

The KSSRDI has a well-established soil testing laboratory since

1989-90 and also two mobile soil testing laboratories. The institute, so far, has tested 15,636 samples from different parts of the state.

Further, the institute has drawn up a massive soil testing plan for 9th Five Year Plan in collaboration with the Department of Seri-

culture, Government of Karnataka which envisages 10,000 soil sample analyses per annum.

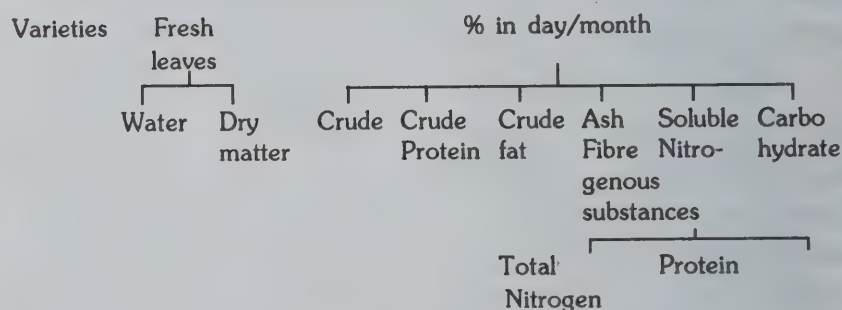
**S.B. Dandin**  
Director

KSSR&DI,  
Thalaghattapura,  
Bangalore.

## More Information, please

The article "Mulberry Improvement Programmes - An Overview" by Dr. S.B. Dandin (**Indian Silk**, May 1997) is informative. However, some more information is required on :

- \* Chemical composition of mulberry leaves of the new mulberry varieties raised in KSSRDI and its substations and Regional Research Stations of CSR&TI.



- \* Strength of the varieties with reference to (a) Early ripening; (b) Wilting and (c) Bacterial diseases of leaves.
- \* Suitability of the varieties for young and later age Silkworms during different seasons.
- \* Response of mulberry varieties to fertilizer/manure.

Also clarification is required on the following:

Variety	Characters	KSSRDI Publication	Table-1 in the article
S <sub>36</sub>	Aneuploids	2n = 30	2n = 28
MR <sub>2</sub>	Rooting percentage	> 80	> 74
M <sub>5</sub>	Internodal distance (cm)	4.5	4.2
S <sub>13</sub>	Weight of 100 fresh leaves (g)	322	365
S <sub>30</sub>	Leaf water content (%)	73-77	70-74

As the article states that the characteristics are based on preliminary evaluation at the KSSRDI, Bangalore, the author may confirm its correctness.

**D. Mahadevappa**

Additional Director of Sericulture (Retd.)  
Department of Sericulture, Bangalore.

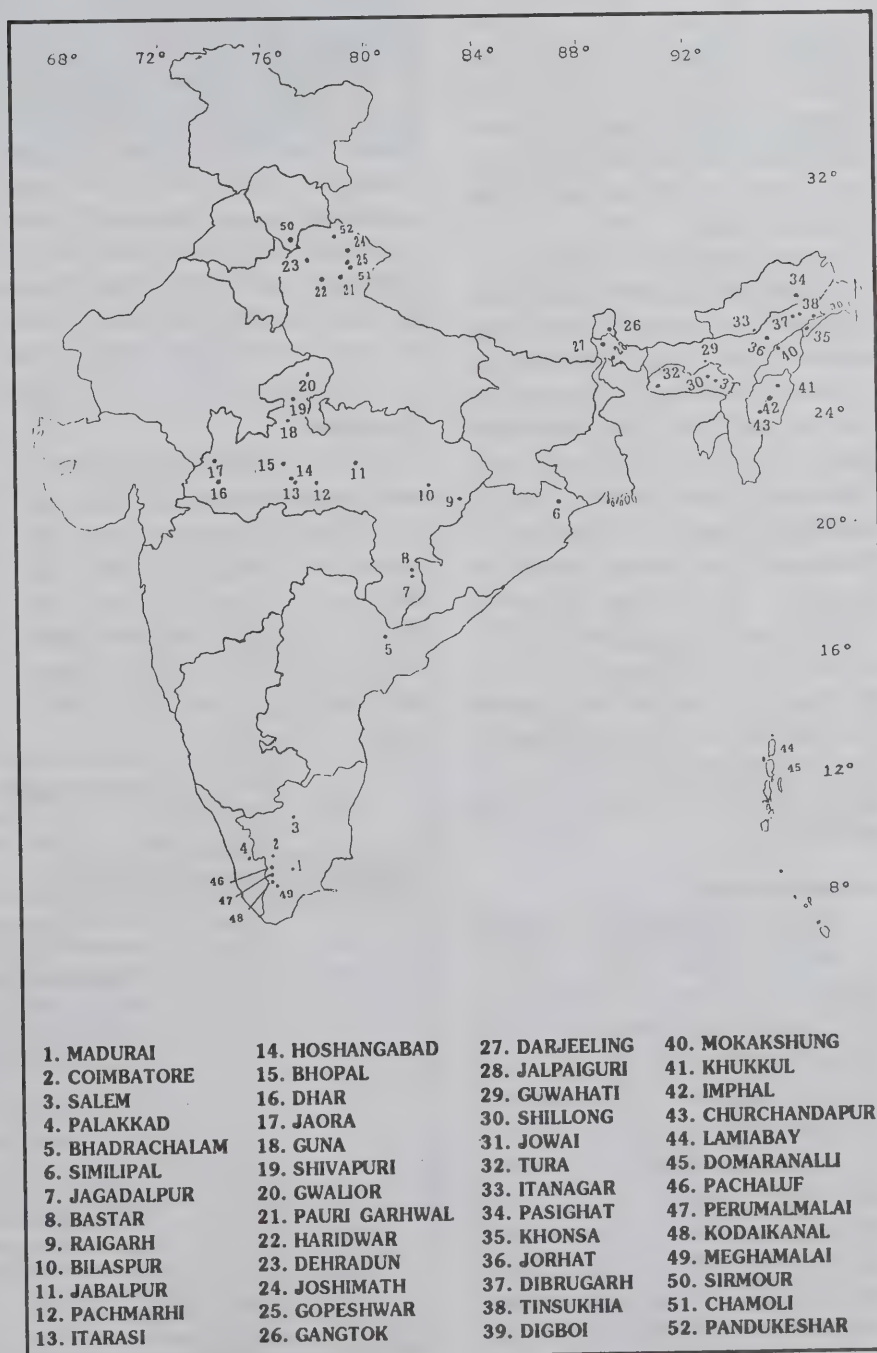


# Role of Germplasm Bank in Sericulture

K. Thangavelu and P. Mukherjee

**T**he magnitude of genetic variability is the determinant factor for the extent of improvement that could be realised through

**Preservation of genetic resources for the cause and prosperity of the present and future generations has been getting worldwide recognition since 1972. Not to be left behind in this global endeavour, Central Silk Board has established Mulberry and Silkworm Germplasm Station (SMGS) at Hosur in Tamil Nadu. SMGS has been assigned with the tasks of survey, exploration, collection, characterisation, classification, evaluation, documentation and conservation of mulberry and silkworm genetic resources, thereby ensuring their meaningful utilization and preventing extinction. The authors reveal the role of germplasm in sericulture for the weal of mankind.**



Map. Exploration sites for *Morus* species in India

various breeding programmes. Therefore, survey and exploration, collection, characterisation, classification, evaluation, documentation and conservation of mulberry and silkworm genetic resources assume greater importance towards meaningful utilisation while extending systematic preservation, thus preventing the most valuable genetic wealth from future extinction. Long term conservation strategy for wild and primitive mulberry genotypes besides present day improved cultivars becomes most imperative since these genotypes are the vital source for disease resistance and other desirable genes.

Sericulturally developed countries like China and Japan have established separate Germplasm Stations long before, aimed at *ex situ* conservation. In India, the Central Silk Board has established during 1991 the Mulberry and Silkworm Germplasm Station (SMGS) at Hosur in Dharmapuri district of Tamil Nadu under the National Sericulture Project. Equipped well to pursue the research on germplasm, SMGS is helping the breeders with useful informations that could influence their breeding programmes, besides providing potential basic materials.

### Infrastructure

SMGS is located in 59.28 acre of land of which 14.5 acre is utilised for raising mulberry base collection, experimental and general plantation for silkworm rearing. Research laboratory for biochemistry, characterisation and evaluation of mulberry, silkworm and silk reeling have been established with sophisticated equipments and computer facilities. There is a glass house provided for introduction of new mulberry collections.

## Role of Germplasm in Sericulture

Global attention on the need for conservation of biodiversity was first drawn in 1972 at the United Nations Environment Conference at Stockholm which strongly advocated preservation of irreplaceable genetic resources for the prosperity of present and future generations. Subsequently, the Green Earth Summit, held in Rio-de geniro and other international fora also have echoed the same view on conservation of bio-diversity. Today, conservation and protection of available genetic resources have become a necessity, consequently national and international agencies, are continuously engaged in extending protection to the biological materials with matching programmes.

However, despite the awareness and sincerity shown to this vital issue, large number of fauna and flora are threatened with extinction. It is predicted that the next few decades will be a period of maximum danger for 40% of world's present species which are likely to be extinct within next 50 years, although there is great amount of uncertainty associated with the calculations on which such estimates are based. It is, therefore, essential to act immediately, to help minimise the eventual extent of loss which calls for long term *ex situ* and *in situ* conservation strategies.

### Mandate

SMGS is mandated to serve as the National Nodal Institution for collection through exploration, introduction, exchange and conservation of genetic diversity in mulberry and silkworm germplasm; promote utilisation of these collections and serve as the National

Data Base on mulberry and silkworm genetic resources; act as the Lead Institute for inter-institutional collaboration for screening/testing/evaluation of germplasm in collections and also serve as the centre for imparting training of mulberry and silkworm germplasm.

Its major activities are to :

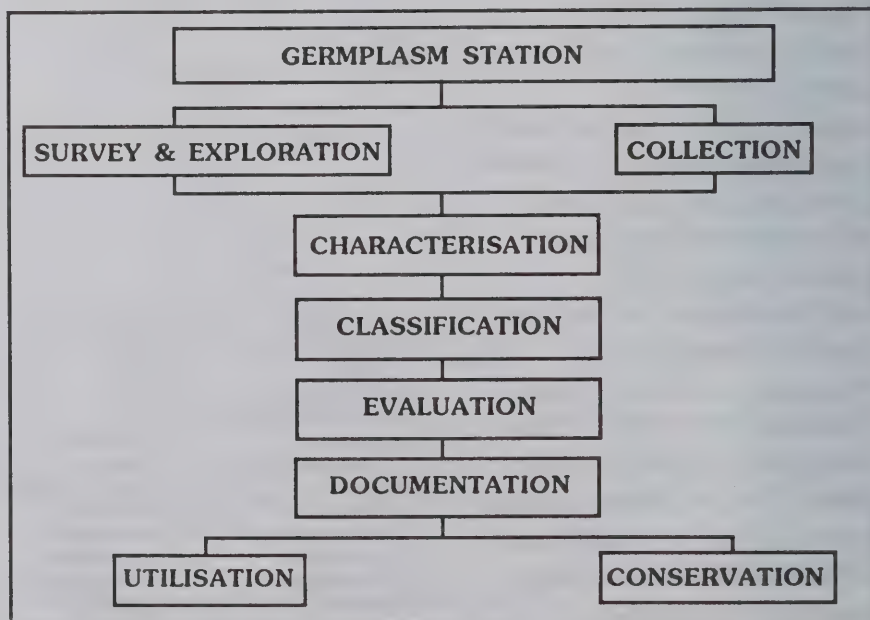
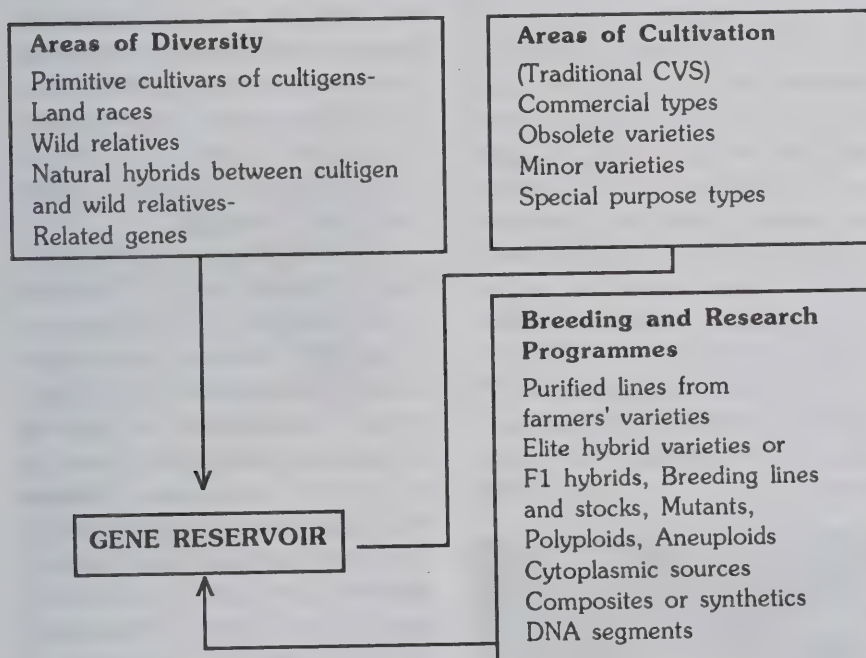


Chart 1. Activities of a Germplasm Station





**Fig. 1. Base collection maintenance of mulberry genetic resources**



**Chart 2. Full spectrum of germplasm in a crop species (cultigen) and its sources**

- Collect through exploration, introduction and exchange mulberry and silkworm germplasm.
- Conduct quarantine check pertaining to incoming germplasm material of mulberry and silkworm.
- Serve as the long term National Repository for mulberry and silkworm genetic resources.
- Undertake characterisation, classification, registration, preliminary evaluation and cataloguing of germplasm collections.
- Play a lead role in inter-institutional collaboration for screening/testing/evaluation of mulberry and silkworm germplasm collections and also coordinate all germplasm related activities.
- Serve as the National Database and Herbarium/Display for mulberry and silkworm genetic resources.
- Impart training in collection, characterisation, documentation and conservation of silkworm and mulberry germplasm.
- Conduct basic studies for providing a sound scientific backup to its services.

### Survey and exploration

The identification of locations of availability of mulberry and silkworm genetic resources is important for their protection and utilisation. SMGS has organised systematic exploration covering southern, central, north-eastern and north-western regions of the country and also Andaman and Nicobar islands. The explorations have been conducted during spring (flowering time of mulberry) and autumn seasons. So far, 15

**Table 1 : Countrywise availability of mulberry and silkworm genetic resources**

Country	Mulberry resources	Silkworm resources
China	2600	600
France	N.A.	53
Italy	N.A.	123
Japan	1312	1572
South Korea	N.A.	286
India	1600	775
Others	1000	500
<b>Total</b>	<b>6510</b>	<b>3909</b>



explorations have been conducted in 13 states, one union territory covering 41 districts. The explorations resulted in 206 collections of mulberry which include distinct wild variants, representatives of very old trees located deep in the forest and developed gene pool resources besides cultivated forms representing *Morus indica*, *M.laevigata*, *M.alba* and *M.serrata*. The locations of explorations are indicated in the map. The explorations conducted reveals that *M. laevigata* is distributed throughout the country both as natural and developed gene pool. The wild mulberry *M. laevigata* collected from Andaman & Nicobar Islands have the largest leaf area (783 sq. cm.) whereas samples from Central India (Bilaspur, Madhya Pradesh) bears large fruit 18.5 cm in length. *M. serrata* is available under natural condition only in few pockets of western India. *M.indica* and *M. alba* could not be located so far under natural forests but was noticed only in the cultivated forms. Through these surveys, 206 mulberry accessions have been added to germplasm till date.

Table 2 : Country-wise representation in the silkworm genetic resources available at SMGS, Hosur.				
Country	Bivoltine		Multivoltine	
	No. of acc.	Percentage	No. of acc.	Percentage
Japan	32	18.93	3	5.26
France	4	2.36	—	—
China	16	9.47	4	7.14
Russia	16	9.47	—	—
Ukraine	3	1.78	—	—
Bangladesh	—	—	3	5.26
India	98	57.99	46	82.14
<b>Total</b>	<b>169</b>	<b>100</b>	<b>56</b>	<b>100</b>

### Collection of genetic resources

The utility of a germplasm assemblage is determined from the varieties of collections. All the genotypes collected are maintained including duplicates, as the effectiveness and the potentialities of germplasm can only be determined with the change in the environment. Collection and assembling of genetic resources however, depends much on the availability under *in situ* condition as also from different national and international sources.

SMGS has collected so far 770 mulberry resources, 56 multivoltine and 169 bivoltine races from different sources after elimination

of duplicates and also made arrangements to collect another 100 bivoltine races from Central Sericultural Research and Training Institute, Mysore, which will almost complete the entire institutional resources presently available in the country. The mulberry collection details are given in Graph which represents 26 countries and 17 species.

With regard to primitive cultivars the gene stock of SMGS includes indigenous univoltine race "Boropolu", collected from Majoli, Assam, perhaps the only place where it is available to day and commercially exploited. Some of the breeds which are cultivated since long and have high adaptability are Lamarin from Manipur, JAM races from Jammu and Mirgund races from Kashmir. Lamarin is highly susceptible to pebrine. However, continuous rearing is conducted over the decades indicating that pebrine spores may be of non-virulent types. Lamarin thus, may help in identifying the virulent and non-virulent types of pebrine spores. Breeding programme involving such material may eventually lead to evolution of disease resistant silkworm breeds.

The JAM and Mirgund series of races are highly adapted under sub-tropical and temperate conditions, respectively, with high sur-



Fig. 2. Variability in silkworm genetic resources assembled at SMGS



vival rates. The studies on the evaluation of these lines at SMGS indicates potentialities of these materials in breeding programme aiming at evolving high survival lines. Similarly, some of the multivoltine geographical races like Tamil Nadu White, Moria, Raj, Kollegal Jawan, Mysore Princess and Kolar Gold are comparatively better than other races and could be used in breeding programmes.

### Characterisation

Characterisation of genetic resources are of utmost importance to establish identity and to generate the idea whether the material collected could be a new entity in the germplasm because of its variability and, if so, how far it differs from those already collected? The function of characterisation is the recording of morphological character of a genotype that can easily be observed or measured and have reasonably higher heritability in any environment. Characterisation in general includes morphological, cytological, embryological, anatomical, physiological, biochemical and biomolecular studies.

Of the 770 mulberry collections, 328 accessions have been targeted in the first phase for characterisation at morphological (22 parameters), anatomical (14

parameters), reproductive phase (26 parameters), biochemical (9 parameters) and peroxidase isozyme banding pattern (17 species).

Anatomical studies revealed 9 resources suitable for drought resistance. Size of pollen and chloroplast count was found to be associated with ploidy level.

Peroxidase isozyme banding pattern of 17 species revealed 2 - 5 bands and the species exhibited 6 different groups of banding pattern whereas *Morus laevigata* collected from different regions indicated wide range of variability in their peroxidase isozyme banding pattern.

Similarly, characterisation of 225 breeds collected for 30 different parameters at egg, larval, pupal, cocoon and adult stages will help the breeders to identify the individual varieties/breeds. It may also help to patent the races. Often, it is observed that with a quest for maintenance of quantitative characters of economic importance, morphological traits of the breeds are ignored, resulting in loss of breed characters. But, the maintenance of the breeds on detailed morphological parameters will certainly help restore homozygosity

## GLOSSARY

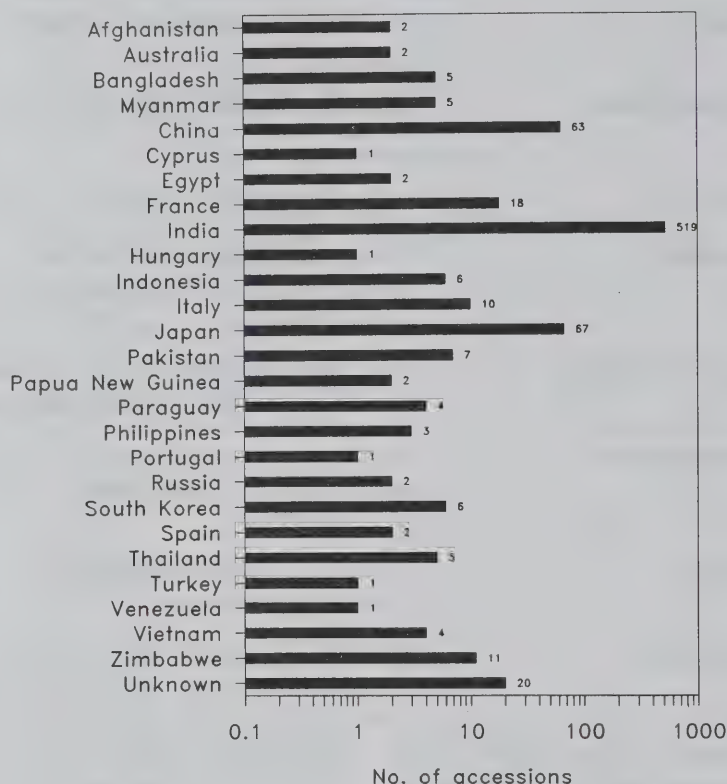
Germplasm	:	A gene reservoir
Exploration	:	Helps in identifying locations of availability of resources
Collection	:	Facilitates development of gene reservoir
Characterisation	:	Facilitates identification and patenting
Classification	:	Promotes specific utilisation
Evaluation	:	Helps in selecting appropriate parent materials for breeding programme
Hot-spot evaluation	:	Facilitates identification of potential genotype for specific purpose/place
Documentation	:	Facilitates dissemination of information on germplasm and exchange
Utilisation	:	Helps to achieve sustainable productivity increases
Conservation	:	Essential to service both current needs and to meet future challenges

**Table 3 : Classification of genetic resources assembled at SMGS**

Mulberry resources	No. of Acc	Silkworm resources	No. of Acc.
Exotic	251	Exotic	81
Indigenous	519	Indigenous	144
Local	68	Geographic	25
Improved/ Evolved	187	Evolved	200
Polyploid	50	Breeds in current use	43
Mutant Exploration Collections }	8	Obsolete breed	73
Cultivars	161	Breeding material	96
Wild	45	Other collections	13

## Countrywise collection of mulberry genetic resources

Country



within a breed while maintaining true breed characteristics. Needless to emphasise, the importance of homozygous parental material in any breeding programme or towards realising heterosis.

The characterisation of germplasm cannot be completed without considering the biochemical and biomolecular aspects. Under collaborative research the Station has already initiated studies on DNA profiling through RAPD system with Seribiotech Research Laboratory (SBRL), Bangalore.

### Classification of silkworm genetic resources

In order to promote utilisation,

classification of the genetic stock is essential so that breeders may procure specific accession for meeting the objective of their breeding programmes. Accordingly, the SMGS collections have been classified in detail (Table 3).

### Evaluation

The evaluation of germplasm is the key to its utilization in breeding programmes. Multilocation test particularly in the *in situ* conditions provides the objective assessment based on information gained from genotype environment interaction besides the phenotypic stability. Evaluation is a continuous process because the direction of breeding changes with the

passage of time, altered environmental and agro-climatic conditions and varying needs of the industry.

In the first phase, 328 mulberry accessions were evaluated in two stages, i.e., juvenile and adult considering 33 parameters. All the silkworm breeds assembled so far have been subjected for evaluation under different seasons considering 41 characters which indicated a wide range of diversity in the germplasm being maintained.

It may be mentioned that not much of these germplasm have been utilized in the breeding programme, particularly in terms of evolving disease resistant and stress tolerant lines. Under the collaborative experiments emphasis has been laid for hot spot studies in relation to various diseases and stress conditions. Such studies will help in identifying specific purpose varieties which the breeder can utilise for further improvement programmes.

### Evaluation for other traits

In addition to breeding for resistance to pest and diseases, the exploitation of genetic diversity for other traits are important in optimising production and stability. The wealth of genetic variation in adaptive responses to soil and climatic conditions conserved in the SMGS gene bank is little known and used even less than related to pest and disease resistant, but it may yet prove to be the most important genetic resources of all.

**Evaluation under stress condition :** There are many biotic and abiotic factors which limit the crop productivity and many breeding programmes have goals to overcome this. Many such programmes focus on improving specific characters in order to increase both qualitative and



quantitative production. The vast number of different specific agro-economic traits and the breeding programmes associated with them needs indepth analysis to formulate common strategies to utilise the available germplasm to overcome the impediments.

Hot spot evaluation of mulberry and silkworm holds the key in this respect. SMGS proposes to conduct hot spot evaluation for various parameters at the national level in collaboration with research *in situtes* of the Central Silk Board at Mysore, Berhampore, Pampore and also the Agriculture University, Dharwad.

### Documentation

There is a dearth of user friendly documentation system with standard formats to facilitate the data exchange and dissemination of information on characterisation and evaluation to a wider audience of users. Arrangements are needed to ensure that evaluation data obtained are given to the breeders along with the germplasm stored and made available.

User friendly software packages "Mulberry Germplasm Information System" (MGIS) and "Silkworm Germplasm Information System" (SGIS) have been developed with a capacity to handle voluminous data, easy retrieval facilities, statistical analysis and retrieval on the special query upto 10 characters. The information will also be available in a catalogue form, shortly which will help the breeders to identify the specific genotypes for their breeding programme.

### Services of SMGS

*Utilisation of Genetic Resources* : The effective use of genetic diversity will be a prerequisite to meet the challenges of sericulture development in future.

Greater use of genetic diversity will be required particularly to produce varieties/breeds adapted to the extreme and highly variable environments of low productivity areas. In addition, the need to combine sustainable productivity increases with mounting pressure on efficient use and conservation of agro-chemicals, water and nutrient resources. It is likely to place even greater reliance on the utilisation of diversity in high productivity areas.

Suggestions to promote utilisation of genetic resources in breeding programme

- Greater emphasis may be laid on the potential under-utilised genotypes.
- Indigenous local mulberry varieties and silkworm races like "Boropolu" and other conserved accessions of SMGS in breeding programmes may be included.
- Promote advance training in breeding at national, regional and local levels.
- Increased collaboration between breeders and SMGS.
- Evaluation of germplasm at regional and hot-spots, the proposed area of use may be conducted.
- Long term pre-breeding activities and base broadening programmes may be evolved and implemented.
- Policies and restrictions imposed to facilitate greater use of genetic diversity may be reviewed.

In addition, more attention should be devoted to breeding approaches which will maintain and increase genetic diversity and thereby reduce genetic vulnerability in the field.

The need is to maintain diversity in breeders' working

germplasm as well as *in situ* and *ex situ* collections.

*Conservation of Genetic Resources* : The spectrum of genetic differences within each variety and across all varieties within domesticated species provides the genetic variation or diversity within the species. This diversity has developed over the years of evolution to form and stabilise the species.

Changes in ecosystem, differences in requirements, behaviour and product output, have different effects and interactions with their respective production environments. Sustainability in these different environments requires different genetic types. Thus, diversity is essential to meet both the current needs and also future changes.

Genetic variability in mulberry and silkworm have formed the basis of sericulture for thousands of years and it continues to provide the genetic base for development of new superior varieties. Shrinking genetic diversity, owing to gradual replacement of indigenous and traditional cultivars by superior high yielding varieties, runs high risk of increasing vulnerability to widespread disease epidemic and large scale damages by pests.

Safe conservation of genetic resources and their continuing availability for improvement programmes are of vital significance. Integrated conservation strategies which include development of a combination of field gene banks, regional germ-plasms, *ex situ* and *in situ* gene banks are most essential and needed to be worked out with a strong network on long term basis.

*The author are with Silkworm & Mulberry Germplasm Station, Hosur, Tamil Nadu.*



# Mulberry Cultivation Techniques under Water Stress Condition

K.V. Benchamin, Syed Nizamuddin, M.G. Sabitha and Asis Ghosh

**Judicious water management under rainfed and irrigated conditions is the crux of the matter in the emerging context of increasing intensity of irrigated crops and dwindling water resources. Realising the gravity of the situation, RSRS, Bangalore, has developed a string of techniques for optimum utilisation of the available resources. Since the quality of mulberry leaves largely depends on water input, a combination of all these techniques will greatly help in efficient utilisation and conservation of this precious, natural resource.**



*Irrigation system plays a vital role*

**I**n a tropical country like India, where more than half of the land cultivated is rainfed and in the other half (as much as 60 per cent of the area receives only partial irrigation, shrewd water management becomes imperative. Added to the woe is the wastage of water in irrigation. Fifty percent of mulberry crop cultivated in India and 33% in Karnataka are under arid or semi-arid conditions, which receives rainfall ranging from 525 to 1300 mm, annually. The irrigated mulberry also suffers severe water shortage due to drying up of open wells and depletion of ground water during post-rainy period. Mulberry crop is affected by acute

moisture stress in soil during post-rainy season resulting in low leaf yield of poor quality and subsequently poor silkworm survival, growth and cocoon yield. Under rainfed condition, mulberry crop during prolonged drought period, suffers due to lack of soil moisture conservation measures, poor soil management and the age-old shallow planting system. Under irrigated condition, both the quantum and frequency of irrigation decrease to match the reduced water resource. Critical nature of the situation is known to farmers, but not the ways and means by which they can cope up to sustain the mulberry crop and quality.



Table 1. Average Month-wise Rainfall in Bangalore District (1991-95)													
Year	Months and Rainfall (MM)												Total
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
1991	1.0	0.0	9.6	88.0	89.6	212.9	21.1	152.2	66.9	540.9	152.2	0.0	1308.4
1992	6.0	0.0	0.0	10.0	167.7	167.6	135.8	98.6	194.2	107.6	70.8	0.0	958.3
1993	0.0	0.0	5.8	0.0	127.6	145.2	58.5	150.6	328.1	273.4	21.6	65.4	1176.2
1994	2.0	40.4	0.0	32.0	88.3	30.8	92.3	94.8	115.3	212.1	21.0	3.2	732.2
1995	2.8	0.0	26.6	6.3	80.2	36.4	86.6	189.4	75.9	126.4	26.6	0.0	657.2
Average	2.4	8.1	7.2	27.3	110.7	118.6	78.9	137.1	156.1	252.1	58.4	13.7	970.5

Judicious water management by the sericulturists for mulberry both under the rainfed and the irrigated conditions is the need of the hour.

### Water requirement

Mulberry crop responds to water significantly and leaf yield in irrigated condition is 200 to 300 percent more as compared to rainfed condition. At the same time, mulberry plant's adaptability to different levels of soil moisture stress is also amazing. Irrigation practices comprise of three interlinked components namely, the quantity of water at each irri-

gation, the interval between two irrigations and the total number of irrigations during one crop period. It is estimated that mulberry requires about 10 irrigations per crop of 60-70 days duration, at an interval of 6-8 days at the rate of 1.5 acre inch per irrigation, to obtain maximum leaf yield. Thus, annual requirement for five crops is about 75 acre inch equivalent to 1875 mm rainfall, distributed equally every week throughout the year. The requirement of 36 mm per week or 5 to 6 mm per day also matches with the average evaporation loss of 5 to 6 mm per

day from soil. Practically, it is not possible to meet this demand based on rains only. The country's annual rainfall is only about 1170 mm and in Karnataka, it is about 970 mm. The rainy days in Karnataka are only 35 to 40 in a year and more than 75% of the total rainfall is received in the five months period from June to October (Table 1). Hence, supplementation of water through irrigation is a must for mulberry to achieve higher leaf yield. It may also be noted that the water requirement is more during the dry hot summer period when

Table 2. Package of Mulberry Cultivation in Plains and Hilly Areas under Rainfed Condition		
Technology Components	Plains	Hills
Variety	Kanva-2 S13 in red loamy soils S34 in black cotton soils	Kanva-2, TR 10 BC259
Spacing	90 cm x 90 cm	90 cm x 90 cm
Planting	in prepared pits of 35 cm x 35 cm x 35 cm size.	in prepared pits of 35 cm x 35 cm x 35 cm size
Plant material	3 to 4 months old saplings or 2 to 3 cuttings per pit	6 to 8 months old saplings
Pruning	Bottom pruning at 10 cm height once in a year with the starting of rainy season.	Middle pruning at 40 cm to 45 cm crown height once in a year. Subsequent pruning at another 15 cm above the previous cut.
Inter-cultivation	Ploughing after bottom pruning and weeding	Ploughing in levelled land manual digging in slopy land and weeding
Organic manure	FYM @ 10 MT/Ha/Yr in one or two split dose Green manure crop (Sunhemp) once in a year in rainy season and mulching	FYM 20 MT/Ha/Yr in one or 2 split dose Green manure crop (Horse gram or Sunhemp) - once in a year in rainy season and mulching
Fertilizer	@ NPK 100:50:50 Kg/Ha/Yr in 2 split doses, in the early and later part of rainy season	@ NPK 250:100:140 Kg/Ha/Yr in 5 split doses matching 5 harvests
Leaf harvest	6 crops, all by leaf picking. Expected yield 8-10 Mt/Ha/Yr	Five leaf or shoot harvests. Expected yield 10-12 Mt/Ha/Yr



**Mulching conserves the soil moisture**

evaporation rate is maximum and water availability is minimum. This contrast makes water management in summer more important to harvest good crop.

### Dryland cultivation techniques

In Karnataka, more than one third of the area under mulberry cultivation is purely rainfed. The average rainfall ranges from 524 to 591 mm in Northern dry zone districts (Bidar, Gulbarga, Raichur, Bijapur and Bellary), from 694 to 868 mm in the central and southern districts (Bangalore, Kolar and Mysore) and from 1192 to 2176 mm in Malnad districts (Hassan, Chikkamagalore and Shimoga). Appropriate packages of mulberry cultivation have been developed for both the high rainfall Malnad hilly areas and the low rainfall plain. Main features of the technology are given in Table 2.

### Rain water management

Successful production of crops in drylands depends upon the availability of moisture uniformly within the field capacity of the soil to hold moisture and the quantum of rainfall itself. Nearly 20 to 30% of the annual rainfall contributes

to surface run-off water, causing erosion of top soil from agricultural dry lands. By suitable soil and water conservation steps, about half of this water can be conserved *in situ* and the rest can be harvested and utilized.

### Watershed management

Dry land farming technology is integrated with the watershed development programmes at village, hobli and taluk levels. Generally 20% of the total land is unsuitable

for economic farming. However, they need to be protected and retained under permanent vegetation like pasture, fodder and fuel crops by following appropriate soil and water conserving measures. Probably mini and major watershed plots can be developed at farmers' level to integrate with the large, wholesome watershed development programme of the village and taluk. The run off water can be collected at suitable location in farm ponds and used for protective irrigation in post-rainy period to improve production of rainfed crop. With 20 to 30% run off, a farm pond of 250 M<sup>3</sup> for each hectare of crop land to collect at least 50% of run off water, can provide minimum 2 protective, life saving irrigation in mulberry to enhance leaf yield.

### *In situ* moisture conservation practices

The principles behind the recommendation of different practices are, to increase the infiltration through reducing the run off, temporarily improving the water on the surface of the soil to increase the opportunity, time for

**Table 3. Leaf Yield in Mulberry Tree Plantation and Impact of Intercropping**

Mulberry Tree Plantation Technology	Leaf Yield/Ha/Yr		Leaf Yield Improvement Under Inter-cropping	
	Year	Yield (Kg)	Yield/Kg/Ha/Yr	% of Improvement
Variety : K2				
Spacing : 6' x 6'				
Crown Height : 6'				
FYM 20 Mt/Ha/Yr	2nd	6695	8422	25.8
NPK 150:60:60 kg/Ha/Yr. in 2 split doses	3rd	8660	12064	39.3
No. of Crops/Year : 4	4th	8810	12510	42.0
Estb. Period 1 year				
Average Yield		8055	10998	36.5
* Intercrop : Sunhemp				



**Table 4. Relationship between Quantum of Irrigation and leaf Yield**

System of Plantation	Quantum of Irrigation/ Crop (Acre Inch)	Leaf Yield/Ha/Yr (Kg)
Variety : K2	25	35592
Spacing : 60 cm x 60 cm	20	31908
Irrigation Method : Ridges and Furrow	15	28845
	10	26792
Irrigation Frequency : 10/Crop (Weekly once)	7.5	25764
Harvest : Leaf Picking	5	24195
No. of Crop/Yr : Five	2.5	21010



infiltration, modifying the land configuration for inter plot water harvesting and improving soil physical conditions so as to increase the rate of infiltration and soil moisture retention. Various practices recommended are, land smoothening in the inter-bund area, formation of small section bunds across the slope, formation of live vegetative bund in more sloppy lands, summer tillage, contour forming, formation of deep furrows after every few rows of plants, formation of ridges and furrows across the slope for water conservation, etc. Practices to minimise the loss of stored moisture include repeated inter-cultivation operations and mulch appli-

cation either by growing suitable green manure crops or through stalks of various other crops.

#### Inter-terrace management

Inter-terrace management practices include zingg-terracing where stagnation of water near contour bund is avoided and instead the same is spread over the levelled terrace nearer to the bund, formation of compartment bunds into small plots to receive rain water and to increase infiltration rate, scooping of soil with basin listers or similar implements to collect maximum water on soil surface for longer duration and higher rate of infiltration, opening of narrow trenches of 50 mm depth and 15 cm width and filling it with plant stalks (vertical mulch-

ing) for better moisture conservation.

#### Application of organic manure

Building up of organic matter under rainfed tropical condition is a difficult task. Nevertheless, its maintenance in soil by continuous application of crop residues and farm yard manure is a must for sustained productivity. Timely mulch crops or leguminous intercrops or cover crops can meet this demand to a greater extent and help improve the soil physical conditions and thus, retention of soil moisture. General recommendation is, application of minimum of 10 mt of FYM per hectare per year and placement near plant basin to broadcast over the entire plot.

#### Concept of tree plantation

Mulberry is found as a tree in nature which, therefore, can be cultivated as a trained tree by maintaining specific spacing between trees and crown height. In fact, this form of cultivation is in vogue in temperate regions and hilly areas. Of late, the concept of tree cultivation has also spread into the plains as a sustainable crop under severe water stress condition in waste lands. Studies

**Table 5. Relationship Between Frequency of Irrigation and Leaf Yield**

System of Plantation	Irrigation			Leaf Yield/Ha/Yr/Kg	
	Quantum (Acre Inch)	Frequency	Total (Acre Inch)	Yield (Kg)	Index
Variety : K2	1	8	8	25241	100
Spacing : 60 cm x 60 cm	2	4	8	28342	112.3
Irrigation Method : Ridges and Furrow	1.5	4	6	25764	100
	2	3	6	25983	100.9
Harvest : Leaf Picking	1	4	4	21050	100
No. of Crop/Yr : Five	2	2	4	25272	120.1
	1	3	3	21833	100
	1.5	2	3	23375	107.1

**Table 6. Leaf Yield Under Different Systems of Irrigation in Mulberry**

System of Irrigation	Quantum of Irrigation (Acre Inch) and Leaf Yield (Kg/Ha/Yr)			
	3.5	7	10.5	14
Drip	31750 (113.6)	35200 (110.3)	39950 (114.5)	43700 (112.9)
Sprinkler	30850 (110.3)	34500 (108.2)	38950 (111.6)	43300 (111.9)
Furrow	27950 (100.0)	31900 (100.0)	34900 (100.0)	38700 (100.0)



*Trees prove better than bushes in facing the water stress*

carries out at Regional Sericultural Research Station (RSRS), Bangalore, has enabled to develop the package of practices for tree cultivation in the plains in southern India (Table 3). It is now possible to get about 8 mt of mulberry leaf per hectare per year through 4 to 5 harvests. It is also possible to enhance income through seasonal intercrops in such system of mulberry plantation, besides improving soil physical condition, fertility status and leaf yield.

#### Quantum of irrigation and leaf yield

There is a positive correlation between the leaf yield and the quantum of irrigation in mulberry.

Leaf yield increased from 21010 kg/ha/yr at 2.5 acre inch irrigation per crop to 35592 kg/ha/year at 25 acre inch irrigation per

crop (Table 4) in a study conducted with K2 mulberry variety and 60 x 60 cm spacing following recommended dose of fertilizer (NPK @ 300 kg:120 kg:120 kg/ha/yr in 5 split doses) and FYM (20 mt/Ha/Yr). At 15 acre inch irrigation per crop (@ 1.5 acre inch x 10 irrigation), leaf yield was 28845 kg. Considering leaf yield to be 10 mt/ha/yr in purely rainfed mulberry crop, yield at 15 acre inch irrigation crop was 188% more and at 25 acre inch irrigation per crop was 255% more. Though the incremental production per additional unit of irrigation decreased, the overall increase in yield even at 25 acre inch irrigation per crop was significantly high. However, the field reality is that the high doses of irrigation is a luxury that most farmers cannot afford, under water scarcity conditions, especially during post-rainy dry months, when majority of them resort to crop saving irrigation.

#### Frequency of irrigation and leaf yield

General recommendation of irrigation for mulberry crop is once in 8 to 10 days @ 1.5 acre inch per irrigation. However, irrigation practices in field range from once

**Table 7. Leaf Yield in Different Mulberry Varieties Raised as Bush Plantation under Protective Irrigation**

Variety	Cropwise Leaf Yield (Kg/Ha)					Annual Leaf Yield (Kg/Ha)
	Aug-Sep	Oct-Nov	February	April	July	
Local	6497	4661	3133	4524	3776	22578
Kanva-2	8562	5546	3422	5715	4153	27398
MR2	9813	5950	4278	6202	4828	31071
S13	11000	6784	5657	6843	5949	36233
S34	10499	5374	4427	6114	5223	31637
S36	10055	6376	4300	6378	5335	32444
S54	9060	6030	4119	5577	5176	29962
RFS135	10460	6648	4826	6193	4621	32754
RFS175	11068	8348	6096	7554	6103	39169



**Table 8. Leaf Yield in Mulberry Varieties Raised as Bush Plantation Under Full and Protective Irrigation**

Variety	Leaf Yield/Ha/Year (Kg)	
	Full Irrigation (10.5 Acre Inch)	Protective Irrigation (4.5 Acre Inch)
Local	25000 (100)	22578 (90.3)
Kanva-2	32000 (100)	27398 (85.6)
S36	38000 (100)	32444 (85.3)
S54	42595 (100)	29962 (70.3)
RFS175	60500 (100)	39269 (64.7)

(Figures in bracket are yield index compared to full irrigation as 100)

in 4 to 5 days in sandy loam soil to once in 15 to 20 days in clayey soils. Farmers are tempted to irrigate as much area as possible with the small quantum of water available, necessitating frequent irrigation. Studies have proved that such practice is also scientifically wrong, since most of the water applied to the surface of the soil through shallow irrigation is lost through evaporation. Experimental evidences support that higher quantum of irrigation per small unit of land at a time is better than low quantum of irrigation over large unit of land and increased frequency (Table 5). Thus, if 8 acre inch irrigation per crop is to be provided, it is better to give in 4 spells of 2 acre inch each rather than 8 spells of 1 acre inch. Leaf yield in the former method is 28.3

mt/ha/yr compared to 25.2 mt/ha/yr in the latter. The trend was the same at other different levels of irrigation tested namely 3, 4 and 6 acre inch per crop (Table 5).

#### Efficient irrigation system

Over the years, water has become a scarce and costly commodity. Its judicious and economic use is inevitable in crop production, and water saving devices have assumed great importance. Efficacy of drip system of irrigation has been established in several crops, including mulberry. Though costly to start with (Rs. 30,000/- to Rs. 50,000/- per hectare), the investment is cost effective and economical in the long run. Studies at RSRs, Bangalore proved that about 33% of quantum of

irrigation can be saved for mulberry crop through drip system, compared to ridge and furrow open irrigation, without loss of leaf yield or its quality (Table 6). It was also found true with sprinkler system of irrigation. For example, the yield level in furrow irrigation @ 10.5 acre inch per crop (34.9 mt/ha/yr) was same as that of 7 acre inch through drip system (35.2 mt/ha/yr) or sprinkler system (34.5 mt/ha/yr). In fact, for any given quantum of irrigation, drip system was found more efficient than furrow system resulting in increased leaf yield by 10.3 to 14.5%. Sprinkler irrigation is also efficient than furrow system and it is well suited to undulated, slopy terrain. Out of different types (Biwall, cane wall, typhoon, drippers, emitters, etc.) emitter type system is found economical and effective for mulberry crop. Though the present recommendation is for using drip system in existing spacing either 90 x 90 cm or 60 x 60 cm, studies are required to work out suitable planting geometry to reduce cost of laying of drip, without adversely affecting the leaf yield and quality. Recently developed paired row system of planting may be ideal for laying drip at a reduced cost. Government of India through centrally sponsored scheme of drip demonstration programme for horticultural and plantation crops has provided adequate subsidy. It is high time that such benefits are also extended to mulberry crop under suitable state or central sponsored schemes.

#### Concept of protective irrigation

The two extreme conditions of mulberry cultivation are purely rainfed and irrigation. However, mulberry cultivation under irrigated condition receives varying

**Table 9. Leaf Yield in Different Mulberry Varieties Raised as Low-Height Tree Plantation Under Protective Irrigation**

Variety	Cropwise Leaf Yield (Kg/Ha)					Annual Leaf Yield (Kg/Ha)
	Oct	Dec	Mar	May-Jun	Jul-Aug	
Local	4910	3344	2679	3223	2738	16894
MR2	6520	4689	2842	3809	3266	21126
Kanva - 2	6165	4196	3410	3507	2872	20150
S13	7362	4943	4414	4114	3376	24209
TR10	6430	4007	3360	3446	3124	20367
RFS135	6132	4559	3892	3892	3242	21664
RFS175	8252	5627	6304	4743	4197	29123
S36	7118	4901	4220	4009	3568	23816

quantum of water due to seasonal shortage, crop priorities in multi-farming system and poor understanding of the requirement of the crop. Under the dry land farming techniques, during the post-rainy dry spell, stored water in ponds is used to provide well-timed protective irrigation to increase yield. The principle is applicable for mulberry crops cultivated under irrigated condition, but faces water problem in certain periods or in areas where water source is limited. Mulberry crop under well timed critical irrigation or protective irrigation can have reasonably high leaf yield compared to non-protective irrigation condition. The package developed for cultivation of mulberry under water stress condition or in areas facing water scarcity based on the work carried out at RSRS, Bangalore is described below.

#### **Bush system of mulberry cultivation**

The package of practices developed for mulberry cultivation under protective irrigation includes mulberry variety RFS 175 (rain-fed Selection 175) or S13, planting in 90 x 60 cm spacing, application of FYM @ 20 mt/ha/yr and NPK @ 280 kg: 120 kg: 120 kg/ha/yr in 5 split doses and only three irrigation @ 1.5 acre inch provided at critical stages of growth. The first irrigation is given soon after the last harvest of mulberry leaves are pruned after intercultivation, the second on 30th day of growth after pruning and the third on 45th day or a day or two prior to brushing of silkworms. Among the nine varieties screened under

protective irrigation, varieties RFS 175 and S 13 gave the maximum leaf yield of 39.1 mt and 36.2 mt/ha/yr respectively (Table 7).

When leaf yield of full and protective irrigation is compared, a significant reduction was noticed with protective irrigation in all the varieties tested (Table 8). In local variety, the yield under protective irrigation was 22.6 mt/ha/yr compared to 25 mt/ha/yr under full irrigation and the reduction was 9.7% only. Similar leaf yield reductions were 14.4, 14.7, 29.7 and 35.3% in varieties Kanva-2, S36, S54 and RFS 175. The productivity under protective irrigation is still high and much more economical in comparison to rainfed condition and though the cut in quantum of irrigation water is about 58%. In fact, the leaf yield with the package of mulberry cultivation under protective irrigation involving new varieties like RFS 175 is as good as local or Kanva-2 varieties under full irrigation.

#### **Low-height tree type of mulberry plantation**

Trees are better form of plantation than bush, to overcome acute water stress in nature. Based on this principle, various studies were conducted at RSRS, Bangalore to understand the performance of mulberry crop as low-height trees and to develop a package of practices for such cultivation. The package consists of use of VAM (Vascular Arbuscular Mycorrhizae), inoculated mulberry saplings for plantation, spacing of 120 x 120 cm between plants and rows, crown height of 90 cm to maintain mulberry as low height trees, application of FYM @ 20

mt/ha/yr in two split doses and NPK @ 200 kg: 50 kg: 100 kg/ha/yr in five split doses. Five harvests were carried out annually following individual leaf picking. Among the eight varieties screened, RFS 175 gave the minimum yield of 29.1 mt/ha/yr, followed by S13 which gave 24.2 mt/ha/yr (Table 9).

#### **Conclusion**

Mulberry plant's adaptability to water stress condition and its response to irrigation are amazing. It can not only survive even under severe conditions of low rainfall but also yield foliage of 4 to 5 times a year to support silkworm rearing for meaningful income generation. Under optimum irrigation, mulberry leaf yield can be increased by 2 to 3 fold from that of non-irrigated level. Between these two extremes, water availability to the mulberry crop is decided by several factors. Many steps aim to conserve moisture in the soil, maximising the harvest of water into the soil, improving water holding capacity of the soil and avoiding water loss through evaporation. Other measures are, to save water during the process of irrigation through appropriate systems. Of late, specific genotypes and cultivation practices have been recommended to match the given field conditions. Ideally, a combination of all these measures is required to conserve and utilize water efficiently in mulberry crop, especially in the emerging situation of increasing intensity of irrigated crops and decreasing water resources, to make the best use of available water.

*The authors are with RSRS, Kodathi, Bangalore.*

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# Sericulture in Gulbarga : Problems and Prospects

A. Prabhakar Rao, R. Raghuraman and S.B. Dandin

**S**ericulture in Karnataka has been predominantly concentrated in the southern parts for many years. The northern districts of the state viz., Raichur, Gulbarga, Bijapur and Bidar remained untapped till recently. Sericulture is

**Sericulture is a recent introduction to the 'hot and dry' districts of northern Karnataka. It is picking up slowly in spite of climatic oddities. Development of specific technologies appropriate to the local conditions, creation of marketing facilities and effective extension would prove instrumental in furthering the progress, say the authors.**

a new venture here and it is marginal farmers who evince more interest in it in these non-traditional areas.

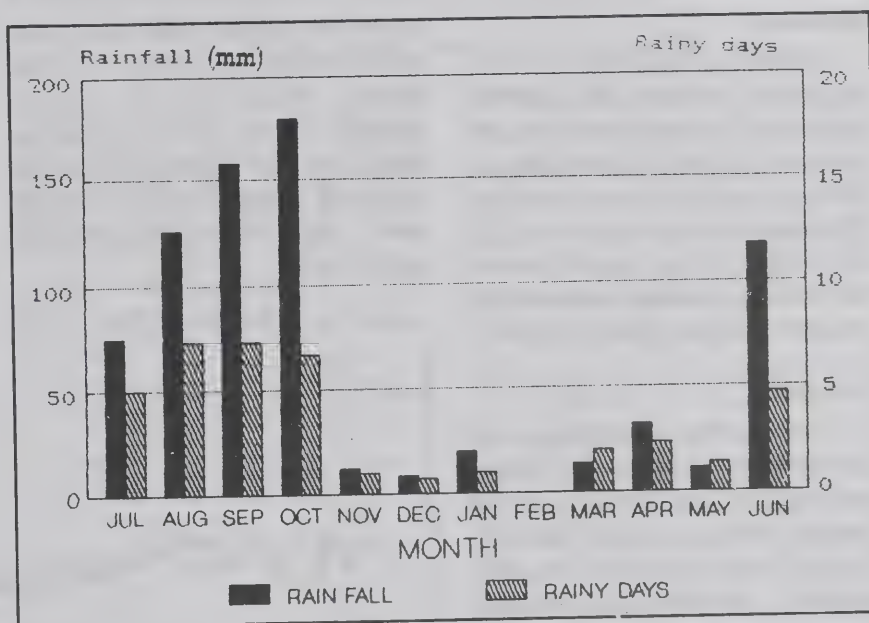


Fig. 1. Mean rainfall and rainy days recorded at Kadaganchi between 1992 and 1996

## Topography and climate

Among the northern districts, Gulbarga is situated between 76°-04' & 77°-42'E longitude and 16°-12' & 17°-46'N latitude and at an altitude of 452 m.s.l. It covers an area of 16,224 sq. km. The cultivable land covers an area of 3,78,669 ha. out of which irrigated land is 1,62,883 ha. The average annual rainfall is 753 mm. The distribution of rainfall spreads over 40 days in a year and most of precipitation (87%) occurs during June-October (Fig.1).

Soils are alkaline, mainly medium to deep black and are classified as vertisol type. The pH of the soils ranges from 6.5 to 8.5 and the organic carbon is low to medium range with deficiency of

micro-nutrients like Zn, Fe, Mn and B.

## Socio-economic conditions

Farmers depend upon one or two agricultural crops during the year. Majority of them possess large land holdings. The number of farmers holding less than five acres is 1,23,899, 5-10 acres is 1,02,009 and more than 10 acres is 1,05,663. The main crops under rainfed conditions are Red gram, Jowar, Bajra and Groundnut while Sugarcane, Paddy and Cotton under irrigated conditions. Sericulture is not yet popular among the large farmers as it is labour-intensive and requires constant attention; but is being practised mostly by marginal farmers.

**Table 1. Crop schedule for commercial rearing**

Season	Date of brushing	Period (Approx. days)
July–August*	9th – 10th July	24 – 26
September–October	9th – 10th September	22 – 25
November–December	9th – 10th November	22 – 25
January–February*	9th – 10th January	28 – 30
March–April	10th March	22 – 25

\* Favourable for bivoltine rearing

## Mulberry

Generally, local and Kanva-2 varieties of mulberry are cultivated under semi-irrigated condition. Pit system of plantation with spacing of 3' x 2' or 3' x 3' is in practice. The irrigation is done once in 12 to 15 days during June–February and the plants remain under rainfed condition during March to May.

## Problems

Sericulturists, in general, adopt the traditional methods of raising mulberry through cuttings with the onset of monsoon (June). The roots instead going deep into the soil, spreads laterally and remain superficially. Such plantations dry up to the root level due to climatic severity during summer resulting in death of the plants. The mortality of the established plants is also recorded every year during summer. This eventually results in the reduction of leaf yield and cocoon production per unit area.

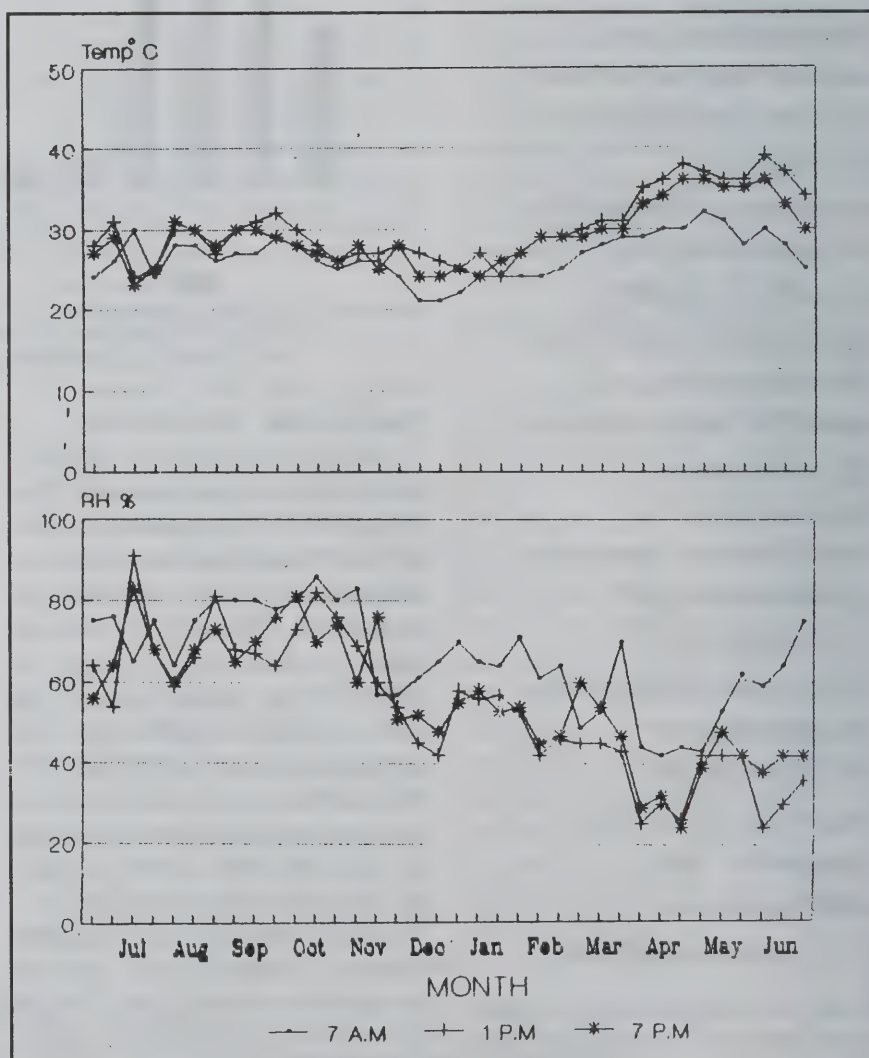
Instead of cuttings, if well developed saplings are planted in the pits of 45 cu. cm. filling with a mixture of sand, farmyard manure and soil (1:1:2), they would thrive even in the hot conditions during summer and establish well. To retain the established plants, it is necessary to develop micro-climate in the mulberry farm by some *in situ* moisture conservation measures against severe climatic conditions. Mulching of soil to conserve soil moisture, growing of plant fencing around the plan-

tation to prevent hot wind and maintaining of higher crown heights would help to reduce mortality of the plants. Filling of failed pits with saplings should be a routine activity during monsoon every year to achieve optimum production.

## Silkworm rearing & climate

Majority of the farmers raise polybivoltine while a few rear bivoltine hybrids. The rearing of silkworm commences in July and ends by March, with a possible 4–5 rearings in a year. The crop schedule for commercial rearing is given in Table –1.

Daily and day-to-day variation in the rearing climate is very high all through the year (Fig. 2). The daily variation in the room temperature ranges from 1–9°C. The mean maximum temperature ranges between 25–30°C during July–February and 30–39°C during March–June. The relative humidity of rearing room varies from



**Fig. 2. Mean room temperature and relative humidity recorded at Kadaganchi between 1992 and 1996**



40–90% during July–February, decreases from March reaching a low of 22% in May. The daily variation in humidity is high, ranging between 5 and 39%.

Due to wider environmental fluctuations, bacterial and viral diseases are noticed in this area (Fig. 3). The occurrence of diseases correlate with the environmental conditions. Viral disease incidence is more when there is low temperature and high humidity (during October–November) and bacterial diseases are predominant when there is high temperature and low humidity (during February–April).

### Bivoltine rearing

Bivoltine rearing has not been proved quite successful all

through the year in the district. The average yield/100 dfls of multibivoltine has always been higher when compared to bivoltine hybrids (Fig. 4). However, bivoltine rearing has given better yield during July and January–February.

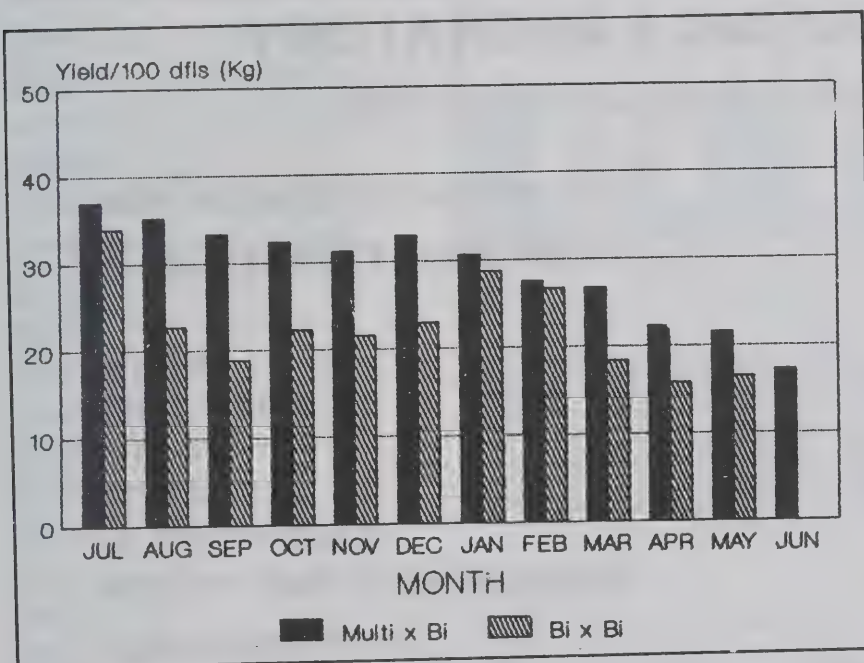


Fig. 4. Average cocoon yield/100 dfls in respect of Gulbarga district between 1992 and 1995 (Mean of 3 years)

Table 2. Cocoon production and marketing during 1992–96

Particulars	1992–93	1993–94	1994–95	1995–96
Cocoon production (M.T.)	255.3	245.8	214.6	250.7
Cocoons marketed at Jewargi (M.T.)	126.8	133.5	122.4	108.2
Reelers (Nos.)	37	36	42	45
Income (Rs. in Crore)	2.06	1.72	1.88	2.88

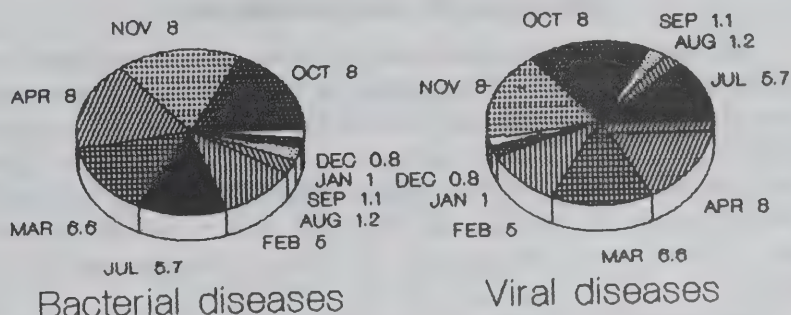


Fig. 3. Incidence (%) of silkworm diseases recorded in Gulbarga district between 1992 and 1995

The environmental conditions, disease occurrence and cocoon yield reveal that the two seasons namely, July and January–February are favourable for bivoltine rearing.

### Cocoon marketing

The average annual cocoon production in the district is 239 tons (Table 2). The market facility is provided at Jewargi where cocoons are purchased by private reelers and also by the Department of Sericulture for its mini filature at Gulbarga. The reeling is carried out by charakas and filatures. The cocoons from neighbouring states like Andhra Pradesh and Maharashtra also arrive here. It is estimated that only 35 to 40% of cocoons produced in the district is marketed at Jewargi and the average rate fetched is Rs. 85 per kg.

In order to improve the market facility, it is necessary to intensify the efforts to increase the number of reeling units either by establishing filatures and/or by tapping potential reelers to enable the consumption of all the cocoons produced in the district at healthy competitive rates.

### Prospects

In order to develop sericulture in this hot arid zone, it is necessary to take proper measures to curtail seasonal incidence of

### **Successful Sericulturists**

*The success of Sriyuths Vittal Jamedar and Bhemshen Rao Kulkarni amply indicate the potential that could be harnessed. Jamedar realised 405 kg of cocoons/acre/year with an average yield of 43.2 kg/100 dfls. and got a return of over Rs. 41,000 per year for a period of four years. Similarly, Kulkarni realised 364 kg with an average of 40.4 kg under return of over Rs. 37,000. During the period, the district average was 29 kg only.*

*The innovative character, willingness and competitiveness among such farmers were the key factors behind their success in sericulture.*

silkworm diseases, improve leaf quality and manipulate environmental conditions. Thorough and mass disinfection of the rearing houses and proper usage of bed disinfectants would enable prevention and control of bacterial and

viral diseases. Crop loss due to muscardine and uzi-fly infestation is very low here which is an added advantage. The "no rearing period" during summer for 3-4 months, is a helping factor in eliminating pathogens build-up.

The mulberry leaf quality can be improved by meticulous adoption of package of practices. Development of appropriate method suited to the local conditions and popularisation of techniques like using wet sand beds below rearing stands, wet gunny cloth near ventilators, sprinkling water around the rearing house would help encounter low humidity problems. The need of the hour is to develop appropriate technologies of silkworm rearing and identify silkworm races suited to high temperature and low humidity conditions.

***The first author is with KSSRDI Sub-station at Kadaganchi, Gulbarga and the rest are with KSSRDI, Thalagattapura, Bangalore.***

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# Subsoiler: For Rain Water Harvesting and *in situ* Moisture Conservation

Satish Verma, Mathew John, S.A. Aqueel and R.K. Datta

**I**n India, mulberry is generally cultivated in the form of bushes. The normal life of a mulberry garden is about 15 years. Frequent cultivation operations are carried out in a mulberry garden for controlling the weeds and

***The CSR & TI, Mysore has developed a technique of using subsoiler for overcoming the problem of formation of hard pan in mulberry gardens and improving the overall root zone environment for increased plant growth. Advantages of using this device are detailed here.***

pests, incorporating farm yard manure and fertilizers into the soil, etc. These operations lead to formation of an impervious layer called hard pan at a depth of 50 to 60 cm from the surface (Fig. 1).

The formation of the hard pan is faster in the clayey soils as compared to sandy soils.

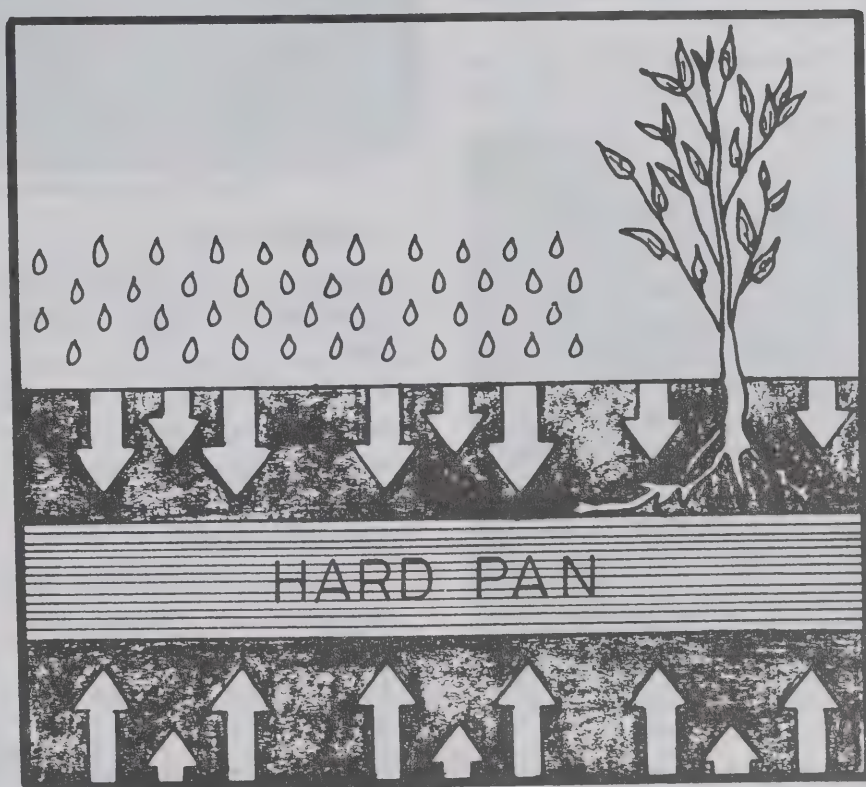


Fig. 1. Formation of hard pan in cultivated soil

## Hard pan

The formation of a hard pan in a mulberry garden is highly undesirable as it :

- Reduces water percolation in the soil profile resulting water stagnation in the root zone. This causes yellowing of leaves and weakens root system.
- Increases surface run-off due to reduction in the percolation of the water into the soil. It causes soil erosion and hence, reduces soil fertility.

- Reduces drainage capacity of the soil leading to accumulation of salts in the root zone. The soils turn acidic or alkaline due to accumulation of the salts in the root zone.

The Central Sericultural Research & Training Institute (CSR&TI), Mysore has developed a technique for overcoming the problem of hard pan in mulberry gardens and improving overall root zone environment for increasing the plant growth.



## Tractor operated subsoiler

Subsoiler (Fig. 2) is a device used for breaking the hard pan and deep soil cultivation. It is used commonly in the watershed for cracking hard soils and inducing moisture infiltration into the soil (Fig. 3). A subsoiler consists of a long and narrow standard with a heavy wedge shaped point. It needs a tractor and 20 to 25 hp to operate. The cost of a subsoiler is around Rs. 10,000. The subsoiler also helps in :

- Breaking the sub-soil, hard pan formed below the normal



Fig. 2. A tractor operated subsoiler



Fig. 4. View of trenches opened by a subsoiler

ploughing zone.

- Reducing water logging and chemical accumulation in sub soil.
- Aerating the soil.
- Reducing soil erosion.
- Overcoming the ill-effects of soil compaction due to continuous cultivation.
- Conserving the moisture in the soil profiles for a longer duration.
- Development of vertical root system.

## Subsoiler for mulberry garden

The subsoiler has been found as a very effective equipment for preparatory land cultivation, plantation, water harvesting and *in situ* moisture conservation in the mulberry gardens.

Subsoiling operation was carried out in the fields of CSR&TI, Mysore as a part of land preparation for the plantation of new mulberry gardens. A subsoiling operation was carried out first to loosen the soil, followed by ploughing with a disk plough. A tractor operated cultivator was used to pulverise the top soil and develop a good tilth (Fig. 4). The fields were left without further operation for a period of two months for absorbing rain water. The trenches of about 60–70 cms deep were opened in the field using subsoiler and filled with loose soil (Fig. 5). Interestingly, trenches opened with a subsoiler worked as small dams for storing the rain water. It was also observed that the entire rain water was absorbed by the loose soil in the trenches. Practically, no run-off took place

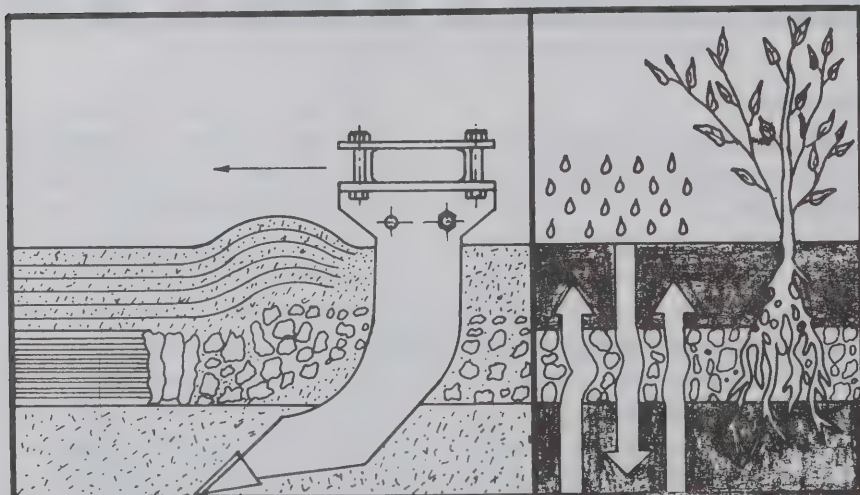


Fig. 3. Breaking of hard pan by subsoiler and improved water movement and root propagation





**Fig. 5. A view of field prepared for mulberry plantation**

in the field treated with subsoiler. The saplings of mulberry were planted in these trenches at desired spacing. A good growth in the saplings was noticed due to availability of ample air and moisture in the soil.

The conservation of the rain water in root zone also increased the irrigation frequency. In the old gardens, the subsoiler was operated periodically. A minimum space of four feet between the rows is required for the operation

of tractor operated subsoiler in the mulberry garden.

On the sloppy land where most of the water drains out during rainy period without much infiltration, the operation of subsoiler across the slope helped in checking the run-off and conserving the rain water into the soil. It also helped in reducing soil erosion and conserving the fertility of the soil.

Under the rainfed conditions, utilisation of subsoiler can help in

**Manufacturers and Suppliers of Tractor Operated Subsoiler**

**Farm Implements (India) Pvt. Ltd.,**

10, Kumarappa Street,  
Nungambakkam,  
Chennai - 600 034

**Tractors and Farm Equipments Ltd. (TAFE),**

35, Nungambakkam,  
High Road,  
Chennai - 600 034

**JNP Agrosystems Pvt. Ltd.,**

15, Poes Road,  
3rd Street, Teynampet,  
Chennai - 600 018

Besides, there are many other local manufactures of the subsoilers in India.

harvesting and conserving the rain water during monsoon which could be used by the plants, subsequently.

Overall, the tractor operated subsoiler has been found effective and economic for harvesting and conserving the rain water, reducing the water and energy requirement for irrigation of mulberry.

**The authors are with CSR&TI, Mysore.**

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# Transfer of Technology : A Crucial Forward Linkage

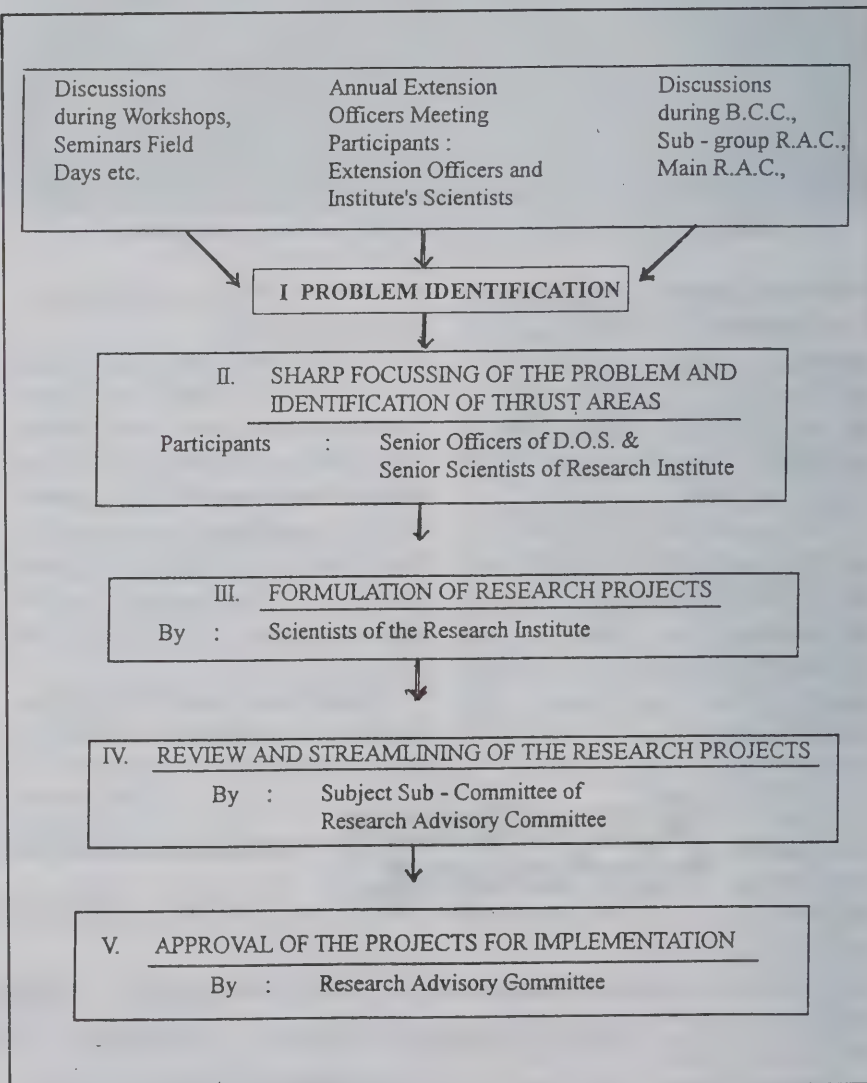
S.B. Dandin

**T**ransfer of technology is the most important forward linkage in achieving the desired results through research findings in target area. Unless this is effectively done, the scientific information generated towards solving the problems of target groups cannot be achieved. This is more so in the

***The effective transfer of a technology to the field is as important as its development itself. Technology could speak by itself, once accepted by the farmers. The author stresses the need for a well-defined forward linkage for the success of TOT in sericulture.***

field of agriculture and other land-based activities where the target population/beneficiaries live in rural areas and their socio-economic structures are highly heterogeneous.

Because of the complex nature of problems and non-existence of a definite technology transfer approach, there is a big gap between "Lab to Land" and "Land to Land" regarding productivity



**Fig. 1. Planning & Formulation of Research Projects**

and quality. What the scientists claim in their laboratories or in experimental gardens is seldom achieved when put to practice. Further, some technologies are successful in certain regions and with certain farmers where the

pre-requisite input facilities are good. Hence, to bring parity in the performance of a given technology and also for its acceptance, the important steps involved must be carefully considered. Further, the involvement of target groups



and extension agencies at the time of field testing and demonstration is also important for successful transfer of the new technologies. The activities involved in the processes are;

- \* Identification of problems hindering the productivity/quality and analysis of specific reasons for the same
- \* Development of technologies.
- \* On-farm/non-farm trials
- \* Front line and first line demonstrations
- \* Analysis of cost-benefit ratio and socio-economic feasibility studies at field level
- \* Popularisation of technologies.
- \* Creation of assured source for supply of technology inputs

All these steps are crucial inputs for the successful transfer of technologies and realisation of expected economical benefits by the user.

Identification of the problem/constraint is the basic thing around which the research programmes are built. It has to be done with the involvement of extension agency/field functionaries. This involvement may be through survey, discussions during farmers meet, field days, extension officers meetings etc. Based on the analysis of reasons hindering the productivity/quality, a sound project/experiment has to be designed in finding out the solutions. Various steps involved in problem identification and project formulation are given in Fig. 1.

Development of technologies by the research institutes is done after careful consideration of the problems and constraints faced. Their economic and social feasibilities are worked out. Further, these technologies are tailor-made to suit the requirement and solving the problems of that particular aspect. This needs the clear

understanding of ground realities and root causes of the problem by researchers. Sometimes, the experiments are conducted in the farmers/sericulturists fields. This will enhance the acceptability of the technology. Another point of concern is the micro level experiments and macro level amplification at the time of implementation. In other words, most of the experiments are conducted involving a very small size population under 100% controlled conditions, whereas the field realities are different. Hence, field trials assume special importance in confirming the laboratory results at large scale level.

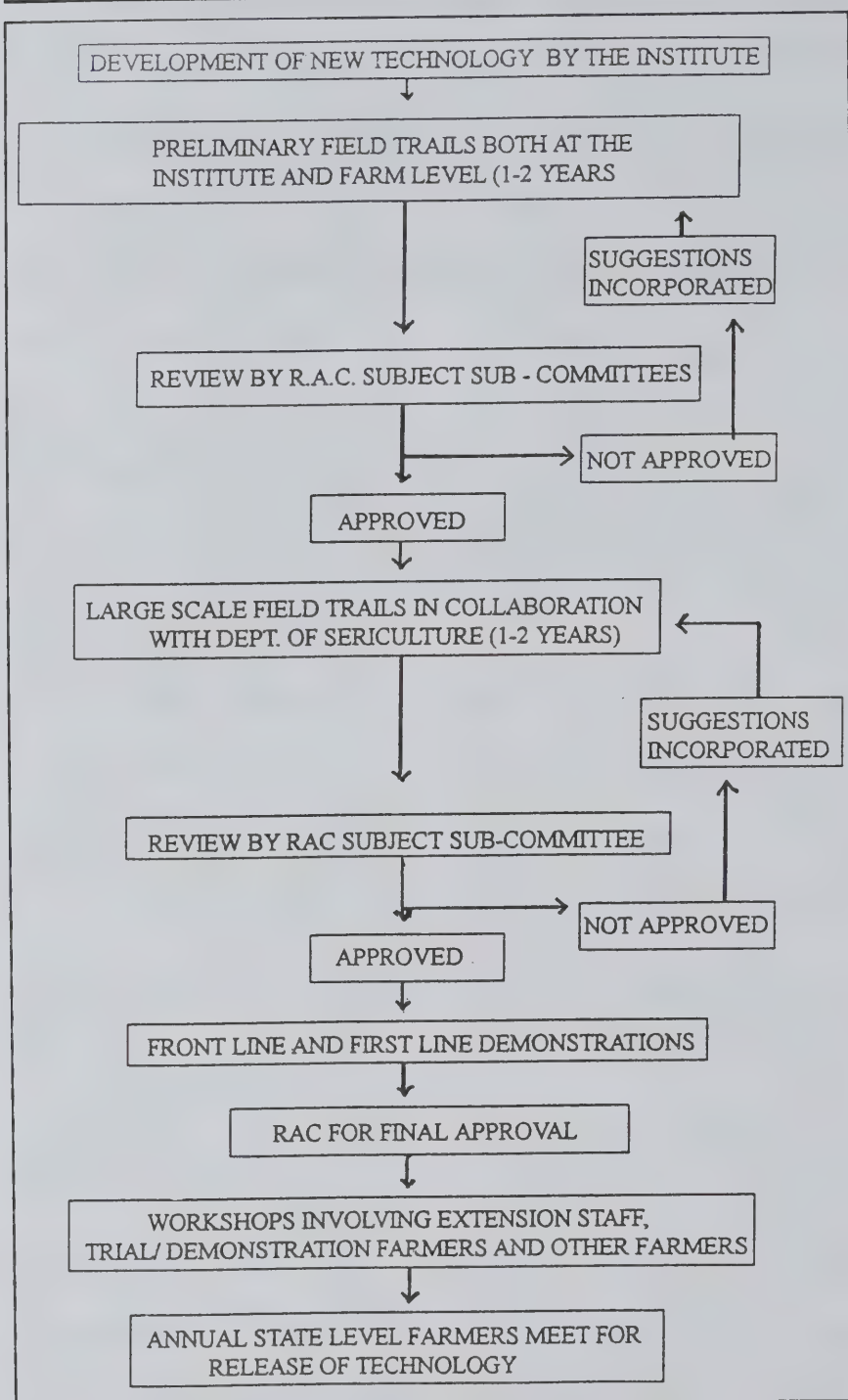
To overcome this problem, large scale on-farm and non-farm trials play an important role and there must be some step wherein the final trials are conducted in the target area involving appropriate population/sample size. This will reduce the error due to large scale amplification of the results and can be realistic. In China, the commercial units/centres namely, egg production centres, seed farms, reeling centres etc., are attached to institutions or corporations. Many times, experiments are conducted only in commercial centres. This is very sound approach to confirm results with large scale activities. Further, involvement of the field/extension staff at this stage is more important as they are the main channels of technology transfer. Unless they are convinced about the overall performance of the technologies under a given situation, its acceptability is questioned.

The fourth step is front line and first line demonstrations. This is formulated on the logistic "Seeing is believing" and must be done more through extension agencies rather than scientific institutions. This helps in convincing the target

group about the merits of technologies and their economic impact. On the other hand, the scientists/technology developers get an opportunity for mid-term corrections/modifications, if any, of the technology to suit the local requirements for its further implementation. Further, it boosts the confidence in technology developer, transferring agency and acceptor and hence, brings in the "Sense of participation". More number of front line and first line demonstrations build the confidence in users. This is a joint venture of both scientists and extension staff in the action site and must be given higher priority. A flow chart for testing and transfer of technology is shown in Fig. 2

The impact of technology is well appreciated based on its economic gain, easy adaptability and application simplicity. Hence, based on the results of front line and first line demonstrations, all the three important points – economic gain, ease in adoptability, efficiency in acceptability must be carefully analysed and conveyed to the department in a single voice with all the implication details stepwise. Ambiguity in development of a package should be avoided.

Lastly, "Technology must speak by itself". This is possible only when farmers are convinced about the merits of the technologies. To accelerate the process of popularising the technology among more and more farmers an integrated package should be adopted. Simple, attractive and effective extension material in the form of posters, hand outs, pamphlets etc., must be prepared in the local languages. Media like TV, Radio etc., also must be effectively utilized. The best propaganda agent is user himself. Hence, it is neces-



**Fig. 2. Testing and release of technology (In collaboration with Dept. of Sericulture)**

sary to encourage some farmers to take the lead.

Another important aspect is source and availability of material/ technology input. In the present

situation, there is no system of providing the technology input at a definite point which a single window system of providing a tested and approved material is a

essential. Hence, the development departments must play a major role in organising the availability of input facilities. All spurious chemicals, out-dated materials etc., are sold in the market without any quality control system. This may lead to duplicate input production and dilute the concept of package. Hence, a co-ordinated system could be considered.

In the present situation, central organisations are more involved in research and concentrating on development of technologies and department of sericulture of various states are involved in transfer of technologies. However, the co-ordination and linkages are to be well defined. Joint or collaborative team spirit for transfer of technologies is to be strengthened.

Further, of late, too many agencies are involved in research and the common forum for technology assessment by a responsible agency is missing. And farmer is in a confused state about the relevance/ correctness of the technologies and choice has become difficult. On the other hand, central organisation needs a much stronger extension set-up for the effective transfer of the research messages to the yield. A directorate of extension and training at central level for exclusive co-ordination of the TOT may provide the much needed hardware and function as CPU. Further, the expenditure for TOT must be proportionately apportioned rather than only generation of information through "research" which is seldom translated into "technology".

**The author is the Director, KSSR&DI, Thalaghattapura, Bangalore.**

*Please make your letters brief and to the point.  
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# Management of Soil Microbes during Summer

P.K. Das, R.S. Katiyar, K. Bhogesha and Y.R. Madhava Rao

**S**oil represents a medium or substrate in which numerous micro-organisms (bacteria, fungi, actinomycetes, protozoa and various other microfauna) live and

---

**Since microbial population inhabiting the soil makes it a living system, its proper management plays a significant role in successful crop cultivation.**

**Management of soil microbes specially during summer calls for extra attention, as reduction in soil moisture adversely affects the microbial population. The article deals with the modus operandi and necessity of maintaining higher microbial activity through soil organic matter.**

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**Fig. 1. Growing green manuring crops in between rows of mulberry**

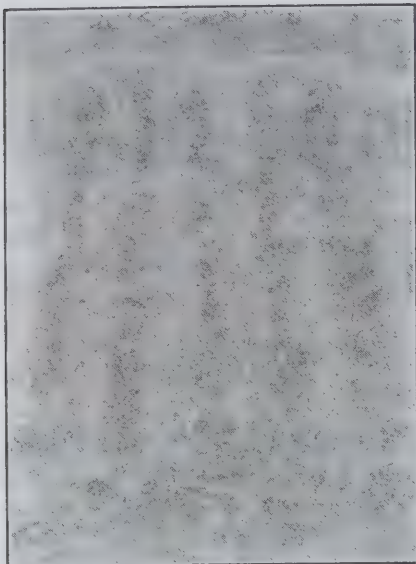
bring about a great variety of processes which are responsible for continuation of the cycle of life in nature. Soil is made up of solid, liquid and gaseous constituents. These can be broadly divided into five groups - mineral particles; plant and animal residues; living systems; water and gases. The microbiological population which inhabits the soil, together with roots of higher plants and animal forms, makes the soil a living system. The quantitative composition of the soil microbial population and its qualitative nature depend largely on the origin and nature of the soil and the relative composition of its inorganic and organic constituents. The prevailing climate and the

growing vegetation also greatly influence the nature and abundance of the micro-organisms that inhabit the particular soil. Studies indicated that the microbiological population in soil undergoes a number of variations and changes more frequently with the season of the year being highest in spring and lowest in summer. This change of population was found to be greatly correlated with increase and decrease in soil moisture and temperature.

## **Effect of soil moisture**

Reduction in soil moisture during summer affects the microbial population adversely in soil. Long duration of soil moisture stress may lead to significant fall





**Fig. 2. Application of dry weed mulch as insulator to check soil moisture loss**

in the soil micro-organisms. At low moisture levels, soil microflora show very weak biochemical activity specially during summer. Intensive development of the microflora and the processes induced by them proceed fairly in moist soil and declines in dry conditions. The ability of microbes to survive changes in soil moisture varies within wide limits. Short-term changes in soil moisture, within definite limits, may not

affect the number of micro-organisms very much, but their activity varies greatly while long spell of dry summer affects the soil micro-organisms adversely by desiccation.

### **Effect of soil temperature**

The activity of micro-organisms in the soil also depends on its temperature. Soil microbial activity is stimulated by rise in temperature upto a definite limit. For most of the soil micro-organisms, the optimal temperature is from 25 to 35°C. Most of the soil micro-organisms have the ability to adapt themselves to gradual changes in temperature. Researches indicated that in warmer regions several soil bacteria have a higher temperature optimum than the same species taken from colder soils. Thermophilic micro-organisms have a temperature optimum between 50 and 60°C. They are distributed among bacteria (mostly spore-forming type), actinomycetes and occur rarely among fungi. However, thermophilic microflora are not characteristic of soil and are mainly introduced with organic manure in the course

of cultivation. Soil temperature is a major factor in the ability of various groups of nitrogen fixing bacteria like *Rhizobium*, *Azotobacter* and *Azospirillum*. Research in Western Australia showed that higher mortality of clover group of *Rhizobium* was recorded due to high soil temperature in summer. However, *Bradyrhizobium* isolated from arid regions were found to be more tolerant of desiccation. From all these information, it is clear that management of soil microbes during summer needs some special attention. To a great extent, this can be done by adopting the following techniques :

**In situ soil moisture conservation :** This is possible by growing any green manuring crops (legumes) in between rows of mulberry at the onset of monsoon (Fig.1). Later on, the well developed green plants should be incorporated in the soil by ploughing before flowering a fortnight prior to cessation of monsoon. The seeds required for green manuring is about 15 kg/ha and should be broadcast when sufficient moisture is available in the soil. Dry weed mulch can be applied soon after the rain ceases (Fig. 2). Addition of any crop residue or even mulching of soil with green leaves acts as a protective insulator on the surface to check the soil moisture evaporation during summer (Fig. 3). This also protects the soil from scorching heat of sunlight.

Green manuring has a positive influence on the physical and chemical properties of soil. It helps maintain the organic matter status of soil and improves its water holding capacity. Green manure serves as a source of food and energy for the soil microbial population which multiply rapidly in the presence of decomposable organic matter. The enhanced activities of



**Fig. 3. Mulching with crop residue during summer**





**Fig. 4. Compost under preparation using sericultural farm wastes**

soil organisms not only cause the decomposition of green manure but also result in the release of plant nutrients in an available form for use by subsequent crops. Green manure crops added to garden soil decomposes like other organic materials. The decomposition is favoured by sufficiency of soil moisture. During summer season, the land should be covered by available dry weeds or frequent irrigation should be given to allow complete decomposition of green

manure. When a green manure crop is ploughed in, the soil organisms become very active in the presence of abundant energy at their disposal. During the process of decomposition, the general purpose organisms predominate leaving the area open for the special purpose organisms only at an advanced stage. Consequently, the succeeding crop may suffer from nitrogen shortage. It is, therefore, desirable to allow the green manure crop to undergo

rapid decomposition for nitrification which will allow a balanced microbial population of soil. Keeping the land covered with green plants or crops during summer helps avoid the direct exposure of the soil to radiation which induces the loss of soil moisture.

### **Maintenance of optimum soil organic matter**

Vegetation is the primary source of soil organic matter. The type of vegetation grown or incorporated influences the quality of organic matter in the soil. Soil organic matter plays a key role in the maintenance of soil fertility and productivity. The effect of organic matter may be either direct or indirect. It directly acts as a source of plant nutrients and food for microbes and indirectly influences the physical and physiochemical properties. The water retention capacity of soil is more pronounced with high organic matter content. Addition of organic substances primarily provides nitrogen to the crops. The organically bound form of nitrogen becomes available to the crops after undergoing the process of decomposition followed by mineralization into inorganic forms.

The beneficial effect of organic manures and crop residues individually and in combination with chemical fertilizer is a well-known fact. Farm Yard Manure (FYM) serves as a good source of organic matter. There should be judicious and continuous use of FYM in combination with inorganic fertilizers maintaining balanced organic carbon level in soil which ultimately balances soil microbial population. The conversion of organic wastes into compost and its use in crop production as a nutrient source are accepted farming practices. During compost making, particularly when



**Fig. 5. Some useful micro-organisms associated with sericultural compost grown on a laboratory medium**

organic waste is converted into high nutrient source, there will be an intense microbial activity and a variety of intermediate organic compounds including organic acids, humic and other newly synthesised microbial substances are produced.

During summer, addition of "phospho compost" prepared by mixing farm wastes, cattle dung, soil, chopped grass and tree leaves with rock phosphate has been found to improve soil microbial activity. Use of sugar factory wastes like pressmud also improves the soil microbial activity in heavy soils while in sandy soils it helps in improving the retention of moisture. The sugarcane trashes could be converted into a very useful organic manure. It can also be enriched with phosphorus. The addition of coir pith compost is also highly beneficial for soil microbial activity in sodic soils and it

is also a very good soil moisture conserving material for rainfed crops. Biogas slurry, a valuable manure, superior to FYM is prepared out of sericultural wastes and contains high plant nutrients. Compost prepared out of sericultural wastes mixed with biogas spent slurry has been found to be almost 4-5 times richer in nutrients than FYM (Fig.4). The addition of this compost in soil has been found to improve mulberry leaf yield and quality significantly. This happens because of the presence of higher number of useful micro-organisms (Fig.5). Addition of vermicompost, another source of improving soil microbial activity needs special attention. The vermicompost contains many useful microflora and its regular use can improve soil organic matter to a great extent which will maintain and encourage microbial population of soil.

Thus, regular addition of organic matter in the soil is the best approach to maintain microbial population of soil. However, during summer, addition of more quantity of organic matter in the soil in any form will act as an insulator against high temperature and will avoid desiccation of soil microflora. In the presence of abundant supply of organic matter, the soil microbial activity is enhanced and the beneficial organisms develop in greater numbers to hinder the activity of disease causing organisms. The situation favours the biological suppression of soil borne pathogens. As such, the importance of maintaining higher microbial activity through management of soil organic matter at optimum levels is the key to successful cultivation of crops.

*The authours are with CSR&TI  
Srirampuram, Mysore.*

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OLIVE



# Murshidabad :

## A Model District for Silk

B.K. Gupta and Y.K. Gupta

**T**he Murshidabad district of West Bengal is a native of silk. The erstwhile Mukshudabad, renamed after Nawab Murshid Qily Khan, had a glorious past during the regime of Sasanka of

***There must be valid reasons for attracting merchants from different parts of the world to establish themselves in the trade of silk in Murshidabad, if one looks back at the history. The silk industry in the district, some time back had been given a rethrust for ensuring its past glory. And, today the infrastructure and the development in all the activities of sericulture and silk industry gives scope for others to follow the suit.***

Karnasubarna, the king of Gour Bengal. The excellence of Baluchari, Garad, Korial and other lucrative silk items drew attention of affluent countries of the world.

The traders, merchants and industrialists of the East and the West were harbouring at Murshidabad through the river Bhagirathi.

### Silk reeling industry

The Portuguese, with a view to develop monopoly in silk trade, first established filature industry in the second half of sixteenth century. Following the report of Hughes and Parker (1618), the British established a silk factory at Cossimbazar. The silk factories at Kalikapur by the Dutch and at Saidabad by Armenians were organised in 1653 and 1665, re-

spectively. According to Lord Valentina (1802), the Jangipur filatures established in 1773 was the largest silk producing centre at that time. The notable silk merchants were East India Co., James Lyall & Co., Louis Payen & Co., Bengal Silk Co., etc.

### Silk exports

The Dutches used to export 6000 to 7000 bales of silk to Japan and Holland every year. Nearly three to four lakh lbs. of silk was marketed throughout Asia while England consumed five to six lakh lbs. of silk, annually.

**Table 1. Progress of silk industry in Murshidabad during last decade**

Sectors	Progress during the year		Improvement (%)
	1983-84	1995-96	
Mulberry field (Acre)	3763.65	7758.72	106.14
Rearers' family (No.)	10340.00	19375.00	87.38
Silkworm egg reared (Lakh dfls.)	70.40	70.00	-0.57
Production of cocoons (Mt)	1265.00	1774.00	40.24
Reeling Units (No.)	852.00	1860.00	118.31
(a) Production of reeled silk (Mt)	125.00	177.40	41.92
(b) Production of silk waste (Mt)	31.50	44.35	40.79
Production of spun yarn (Mt)	N.A.	0.60	-
Silk weavers family (No.)	12400.00	14000.00	12.90
Silk weaving looms (No.)			
a) Reeled silk	N.A.	5103.00	-
b) Spun silk	N.A.	705.00	-
Production of silk fabrics			
a) Reeled silk (Lakh Sq. mt)	28	55	96.42
b) Spun silk (Lakh Sq. mt)	N.A.	2.5	-
N.A. = Not available.			

## Natural resources

The alluvial soil deposited by the river Bhagirathi, is most suitable for mulberry. The optimum rainfall leads to the maximum production of mulberry leaf in the district. Further, congenial climate ranging from October to March, prevailing in the district, favours silkworm rearing throughout the year. All these natural advantages were utilised by the British and they intensified sericulture in most of the villages in the district.

Murshidabad is one of the industrially backward areas but silk industry is well established there. Central Silk Board, Department of Sericulture, West Bengal Zilla Parishad, District Administration, Khadi and Village Industries Commission (K.V.I.C.), West Bengal Handloom Co-operative Society etc., initiated a joint venture for the benefit of artisans of silk industry and the district as a whole. Such effort is ensuring rehabilitation of "Sonar Bangla" by way of patronising silk industry. Thus, within a decade, considerable im-

Activities	Employment rate in mandays (No.)	Total mandays (No.)	Women's share (No.)
Mulberry cultivation	60/crop/acre	18,62,092	3,61,618
Silkworm rearing	25/100 dfls	16,75,883	10,05,529
Reeling	2/10 kg cocoon	5,15,955	48,293
Spun yarn	1/100g Spun yarn	6,00,000	6,00,000
Yarn processing	300/loom/year	17,42,400	17,42,400
Weaving	300/loom/year	17,42,000	—
Total		81,38,730	37,57,840

provements were observed in the district (Table 1).

It is clear from Table 1 that there exists deep seated relationship between development of mulberry area (106.14%) and silk fabric production (96.42%). Most interesting aspect is that there is a tendency of rearing less number of silkworm eggs/acre, the consumption of dfls remains same (70 lakh), yet there are improvements in other parameters of silk industry. This evinces that sericulture extension plays a pivotal role in the development of silk industry.

As a result, rearers are motivated in adopting high yielding silkworm hybrids, mulberry variety and also improved package of practices for mulberry cultivation and silkworm rearing.

Silkworm rearing has spread over 360 villages while reeling is concentrated in Majhampur (Beldanga-1), Hatibanda and Panahati (Jangipur) and villages of Nabagram and Khargram blocks and silk looms are located in 54 villages under 12 blocks (Table 2).

## Employment potential

Silk industry had been identified for employment generation in rural areas. It has been estimated that one acre of mulberry plantation requires 240, 216, 66.5, 239 and again 239 in cultivation, silkworm rearing, reeling, yarn processing and weaving, respectively in a year. In addition, 10 mandays per kg of spun yarn are generated in bye-product sector of the industry. Thus at present, around 81.38 lakh mandays are directly engaged in different activities of silk industry in Murshidabad (Table 3).

## Women's role

Women's role in the silk industry is inseparable and they attend the delicate activities. In silk reeling and mulberry cultivation, the participation of women is 9.36

**Table 2. Blockwise distribution of silk looms**

Blocks	Looms (No.)		Total (No.)	Weaving villages (No.)
	Reeled silk	Spun silk		
Murshidabad	566	—	566	7
Berhampur	80	—	80	2
Hariharpara	160	70	230	—
Raninagar-1	255	470	725	6
Bhagwangola-1	80	—	80	1
Jiaganj	55	—	55	1
Jangipur	355	—	355	3
Nabagram	92	—	92	4
Khargram	2355	20	2375	12
Barwan	580	30	610	8
Kandi	450	—	450	4
Bharatpur	77	115	192	2
Total	5103	705	5808	54



**Table 4. Model for growth of silk industry of a sericulture district**

Mulberry area per family	0.4 acre
Cocoon production per acre	228.65 kg/year
Cocoon production per family	91.56 kg/year
Cocoon consumption per reeling unit	953.76 kg/year
Raw silk production per reeling unit	95.38 kg/year
Production of silk waste per reeling unit	23.84 kg/year
Reeled silk consumption per loom	52.16 kg/year
Silk fabrics production per loom	1078.00 sq. mtr

and 19.42%, respectively. But, their participation in silkworm rearing is upto 60%. Processing of weft yarn is the domain of women (100%). Silk yarn for weft repeatedly passes through the hands of women for processing before weaving.

The pierced cocoons and reeling waste (Jhute) are processed by women to make lucrative spun and matka fabrics. So, they are in a way responsible to run 705 spun silk looms in the district. Thus, attempts were initiated to develop

women-friendly technologies.

### Prospects

Presently, the district consumes annually 53 Mt. of warp and 214 Mt. of weft silk yarn to run 5103 silk looms and 30 Mt. warp yarn and 6 Mt. spun silk for 705 spun silk looms. Thus, the district produces 36.4 Mt. weft yarn required for self-sufficiency, but there is paucity of warp yarn. In order to meet the demand of warp yarn, 265 basins of improved reeling units should be established.

Though weavers here, are in a good number (about 14,000), the shortage of looms is acute, once the situation is at the desirable levels, there would be an increase not only in the products but also in the mandays required.

While Malda is found potential for production of cocoons and raw silk, Birbhum is engaged in production of cocoons and silk fabrics. Murshidabad is known for production in all these sectors of silk industry i.e., commercial cocoons, raw silk and silk fabrics including matka and spun yarn at its optimum level. This helps to draw a model (Table 4) for growth of silk industry of a district.

On the basis of above findings, it can be concluded that 10 acre of mulberry garden is required to run one country charkha reeling basin which can provide sufficient raw silk required for eight handlooms.

*The authors are with CSR&TI, Berhampore (WB).*

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## RESPONSES

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# Twisting Machines for Quality Muga Reeling

S.N. Mishra

**M**uga silk is natural protienaceous fibre spun by muga silkworm -*Antheraea assamensis*. This is the costliest commercial textile fibre produced in the world and one kilogram of reeled quality

**The golden muga silk - the costliest among the natural textile fibres produced in the world- is being reeled and twisted on different types of machines. The author discusses about different reeling, twisting, reeling-cum-twisting machines for their advantages over the traditional areas and other developments. They also opine that low cost devices should be introduced for technology upgradation.**

silk yarn costs around Rs.5000. Total annual output of muga raw silk is only around 75 tons and more than 90% of it comes from Assam, India.

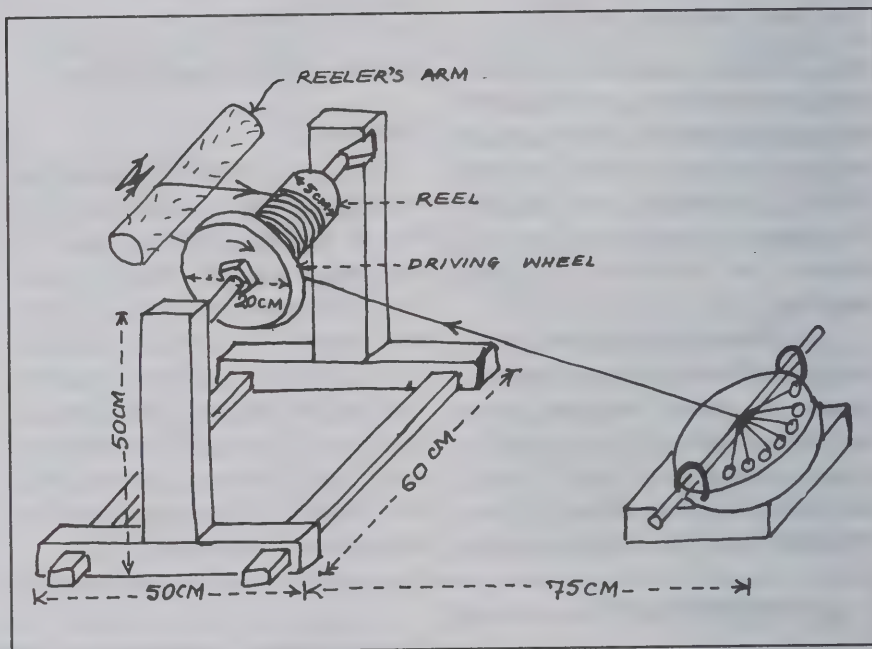


Fig. 1. Yarn Path in Muga Reeling on Bhir

## Muga reeling

Muga reeling is unwinding of filaments from cocoons, combining 8-12 filaments together and getting a thread suitable for weaving of cloth. This process is broadly divided into (i) Preparation for reeling and (ii) Reeling of threads.

## Preparation for reeling

This includes procurement of cocoons, stifling, storage, cooking and search of continuous filament. After harvest, brownish yellow cocoons are locally stifled by exposing to direct sun for a week. Efforts are on to introduce black cloth and hot air stifling. These cocoons are sold to traders/mas-

ter weavers of Silk Weaving Centre at Sualkuchi in Kamrup district. For determining reelability of cocoons, primary test is done by pressing stifled cocoons with fingers. When pupa inside gives hard feeling, cocoon is treated as reelable. If pupa is crushed easily, cocoons are considered defective/unreelable. Cocoon size, brightness of filament length and denier are secondary test for muga cocoons (Table-1). Village agents sell these cocoons to weavers either on cash or barter them for muga fabrics. At present, 1000 quality cocoons cost Rs.750. About 5000 cocoons are packed in a gunny bag and transported mostly by



**Tables 1 : Commercial Characters Of Muga Cocoons**

Crop regular/overlapping	Month	Cocoon size (C.C.)	Cocoon Wt. (GMS)	Shell Wt. (GMS)	S.R. %	Filament Length (Mtr)	Filament Denier
Jarna	Feb-Mar	14.00	5.00	0.40	8.00	275	5.00
Jethua	Apr-May	22.00	7.00	0.60	8.77	425	5.80
Akhurna	Jun-July	18.00	6.00	0.50	8.33	325	5.40
Bhadia	Aug-Sep	16.00	5.50	0.45	8.18	300	5.20
Kotia	Oct-Nov	24.00	8.00	0.70	8.75	450	6.00
Aghonia	Dec-Jan	20.00	6.50	0.55	8.46	350	5.60

road. For storing cocoons, wire mesh cage of size 4.5 x 3.00 sq. mtrs. having 3 tiers is used, where cocoons are well protected from rats. About 3.00-4.50 lakh of cocoons can be stored in one cage for a year. Reelability of cocoons decline @ 25-50% per year, after a year of harvest.

Muga cocoons shell is softened by cooking in a single open pan for upwinding of filaments. For cooking 500 cocoons, about 10 litre of water is placed in 15 litre capacity pan with 25-50 gm. of soda. Cocoons are cooked in boiling water for 15-30 minutes, to secure uniform softening of shell without bursting the cocoons. Cooked cocoons are individually deflossed by hand and end of continuous filament is searched. About 250 cocoons can be deflossed by one worker in an hour.

### Reeling

Muga cocoons are reeled in hot water bath at 60°C. Well cooked cocoons give reelability of 80-90% in number and raw silk recovery from 40-45% in shell weight. One kilogram of reeled yarn can be recovered from 5000 quality cocoons. Well-cooked cocoon shells are converted into reeled yarn on reeling devices. Muga yarn is reeled on the principle of unwinding, combining by twist and winding. As optimum

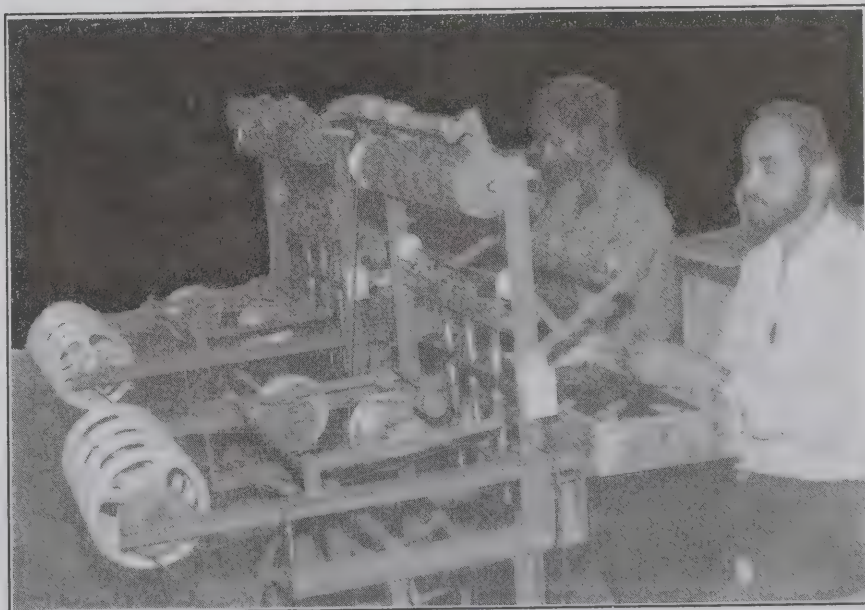
unwinding speed of cocoon is around 20-30 metre per minute, due consideration has been given to low unwinding speed while designing reeling devices. Since 1951, attempts are being made to improve reeling devices and develop machines on twisting principle. Yarn is hanked onto 1.5 metre standard reel in hanks/skeins of 20-30 gm.

### Reeling devices

#### Intermittent reeling device (Bhir)

Bhir (Bhauri Muga Leta) and pedal Bhir are made on intermittent principle. These are the most primitive devices and account for 95% of reeling. In this machine,

unwinded filaments are combined together by twisting thread on reelers inclined-arm with rolling fiction. In eight hours, about 500 cocoons can be reeled and 100 gm. of yarn is recovered. For reeling bamboo of 18-20 cm. circumference is used. This is a low height machine and needs two persons for conducting reeling. One Bhir needs a space of 2.50 x 1.00 sq. mtr (Fig.-1). Stagnation of technology, its difficult warping and slow weaving have caused shrinkage in number of muga weaving handlooms & shift towards mulberry weaving, although profit margin in muga weaving is higher. With change in social working habits and practices, traditional intermittent devices are not considered dignified. Bhir reeling is neither eco-friendly nor human-friendly. This reeling system causes health hazard on reelers arms like cuts, skin irritation/allergy etc. Component filaments are not well combined and thus warp needs prolonged sizing/loading in arrowroot powder and flour and further dyeing of sized warp in golden yellow colour



**Fig. 2. CSTRI Muga Reeling-cum-Twisting Machine**

(muga colour) is necessary.

### Twisting machines

To overcome the limitations of intermittent Bhir, twisting machines have been modified and improved for reeling quality yarn. When yarn is reeled on twisting devices component filaments do not come apart during processing, warping and weaving because they are held together by spirals of twist. Thus, reeling on twisting machine helps in holding filaments together, better thread capacity in fabric weaving, yarn uniformity, better texture and high elongation. This twisting is done either by ring spindle or by flyer spindle. Experimental studies have also revealed that introduction of croissure alone will not be able to combine filaments properly and twisting is also necessary for quality yarn. Now a range of muga reeling machines based on twisting principle are available for reeling quality yarn. (Table - 2).

#### CSTRI, machine

This is a four spindle muga reeling-cum-twisting machine

based on ring spindle twisting system. The machine is 1.5 metre high, one metre width and 75 cm. long. In general, the machine is operated by power and has stand-by pedal driving arrangement. This is a moderate cost machine made of iron frame and light in operation. Yarn produced on this machine has been liked by weavers and can be used as warp on account of better twist & strength. About 154-160 gm. of yarn is reeled on this machine. Reeling

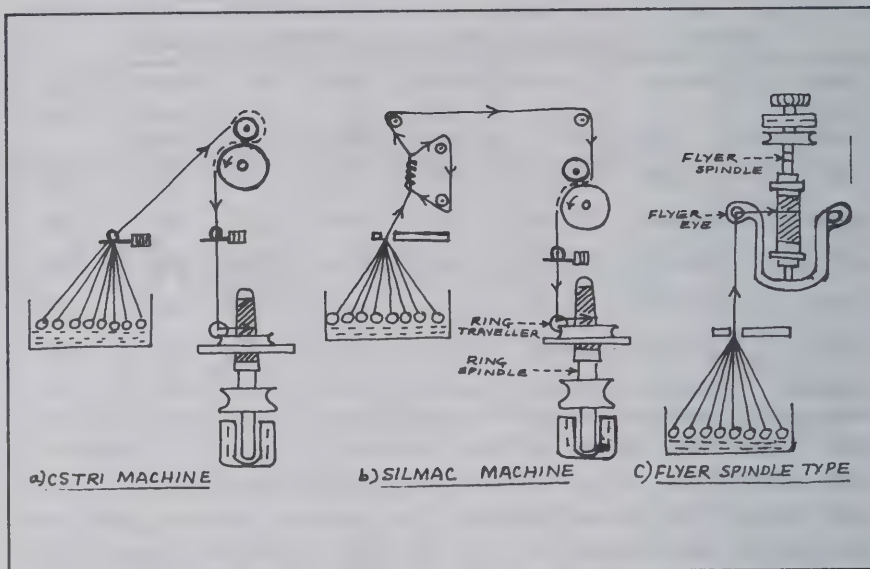
speed is about 40 gm./spindle/8 hour. (Fig.-2)

#### Silmac machine

This is also based on ring spindle principle and one basin contains 12 spindles. Effective reeling of cocoon is possible on six spindle. The machine is 3 mtr. wide, 1.5 metre long and two metre high. For combining of component filaments both croissure system and ring spindle twister is available and the machine is driven by electric power. It works on slow speed reeling-cum-twisting principle and long yarn path helps yarn drying before winding. Yarn production of six spindle by one reeler is similar to that on CSTRI muga reeling-cum-twisting machine. On this machine also about 154-160 gm. of yarn is produced in 8 hours at the reeling speed of about 25.00-27.50 gm./spindle/8 hour (Fig.-3).

#### Flyer spindle type

The first machine on this principle was N.R.Das type machine. This machine has its own limitations. Recently on this principle a 4 - flyer spindle type power-cum-



Yarn Path in Various muga Reeling cum Twisting Machine

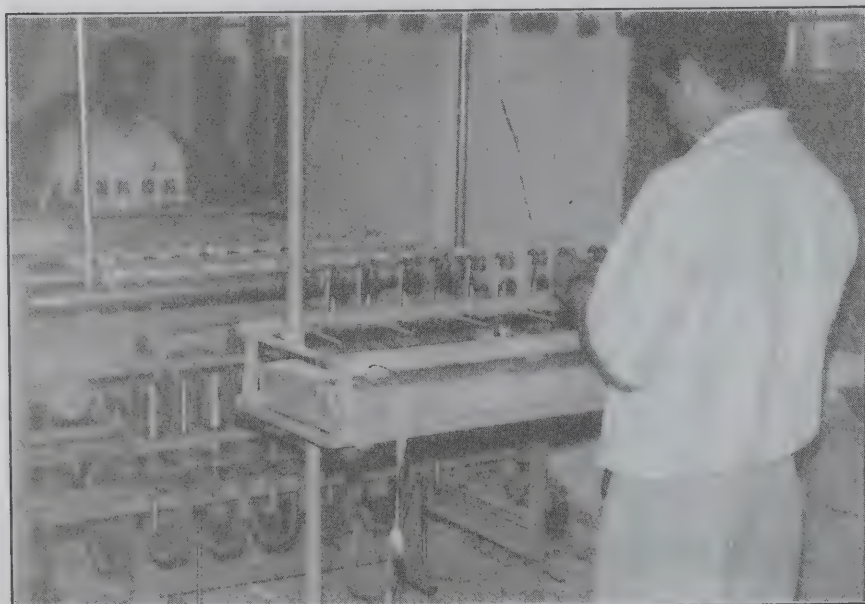


FIG. 3. SILMAC Type Reeling cum-Twisting Machine





**Fig. 4. Flyerspindle (4-spindle)  
Muga Reeling Machine**

manually operated machine has been devised. Twisting and combining of filaments in composite thread is done by flyer spindle (Fig.4).

<b>Tables 2 : Comparative Reeling Performance of various Muga Reeling Machines (Yarn-48 Denier)</b>							
Machine model	Combining Device	Reel Cirm. (Cm)	Reeling Speed (m/min.)	Revol/ min.	Effective spindle/ reeler	Production/ basin/ 8 hanks (g)	Twist/ inch
Bhir	Armfriction	20.00	30.00	600*	1	96.00	0.50
Flyer Type	F.Spindle	10.00	10.00	1200	4	102.00	3.00
CSTRI	Ring spindle	7.50	15.00	3600	4	154.00	6.00
Silmac	Ring Spin. & Croissure	7.50	10.00	3600	6	154.00	9.00

\* Rolling on reeler's arm.

Presently attempts are being made to introduce these reeling - cum-twisting machines in muga reeling sector. However, factors like strong faith in traditional practices, limited purchasing power, lack of service marketing concept in supporting agencies, absence of marketing promotions from machine manufacturers, fear of mar-

ket rejection of new products are restricting penetration of these machines. At present, cost of Bhir set is within Rupees one thousand only. Hence, it is necessary to introduce low cost new devices for technology upgradation.

**The author is with DCTC, CSB, Sualkuchi, Assam.**

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# Japanese Silk Industry : A Retrospection

The year 1996 showed a severe situation for the Japanese silk industry. Domestic cocoon and raw silk production decreased continuously, and for raw silk prices, even though it had kept relatively high prices until September, it showed sharp decrease after then and moved around a low level. In the meantime, amount of imported silk made-up goods, which had increased until 1995, decreased considerably compared to the previous year. Under these circumstances, domestic silk consumption moved not only from Japanese-style items to European but also to additional other items.

## Overall supply and demand of silk

The scale of supply and demand of silk (in terms of raw silk) in 1996 was the same compared with the previous year. Namely, the total supply of silk was 31,000 tons (previous year 31,000 tons), and the total demand was 22,200 tons (previous year 22,100 tons).

The cocoon production decreased by 44% compared to the previous year, due to the decrease in sericulture farm households, aged sericulture workers, lack of successors and decline of comparative earnings of cocoon etc. Raw silk production decreased by 20% compared to the previous year, owing to the uncertain prospects of raw silk price, decrease in filature factories (by 8% compared with the previous year) etc., in spite of the increase of imported cocoon quantities (by

31% over the previous year).

Regarding the whole silk supply and demand situation, the ratio of imported quantities to the total supply (raw silk, twisted yarn, fabrics and silk made-up goods) rose from 61% in 1994 to 65% in 1996 accompanied by a decrease of the domestic production in recent years. However, total imports, which had a remarkable increase tendency, decreased by 12% compared with the previous year, because of the sharp decline of the Yen exchange rate etc. Consequently, the goods which had been advertised as cheap among the imported goods have suffered a severe impact by sudden rise in prices.

The share of European style silk goods in total imported silk made-up goods (8,800 tons) in 1996 was 91%, and that of Japanese style silk goods such as the Kimono was 8%.

On the demand side, domestic demand occupied 97% and the export of fabrics and made-up goods was in small quantity.

## Silk consumption

In recent years, the consumption of textile fibres (both natural and man-made fibres) for clothing and household use in Japan has been decreasing a little, year by year, and in 1995 consumption decreased to 780,000 tons, 4.2% down against the previous year. In the domestic consumption, the share of natural fibres was 48.9% (1995), that was below the 50% which had been maintained for a long time. Further, for the share of silk in natural fibres, it has been maintained on a stable 2% mark, and in 1995 it occupied 2.31%.

For the consumption trend of silk for clothing and household use (raw silk, thrown and spun silk yarns, floss silk, etc) domestic production and import the use for clothing decreased year by year whereas it has a tendency to increase in the household use. In 1995, the clothing use for Kimono and western clothes occupied 96.5% of total consumption (8,828 tons) and household use such as bedclothes and umbrellas was 3.5%.

Table 1. Situation of sericulture and raw silk reeling

Item	Unit	1996	1995	1994	96/95 (%)
Number of Sericultural farmers	x 1000	790	1360	1900	58
Mulberry field	1000 ha	1930	2630	3390	73
Cocoon production	1000 tons	300	540	770	56
Number of filatures	factories	61	66	83	92
Raw silk production	tons	2579	3229	3901	80
Cocoon imports	tons	2988	2273	5148	131

(Source : MAFF, MOF)



**Table 2. Supply and demand of silk (in terms of raw silk)**

Unit : tons x 100

Year	Supply								Total demand	Demand						
	Total supply	Begin stock	Production	Total import	Raw silk	Silk yarn	Fabrics	Made up goods		Total export	Raw silk	Silk yarn	Fabrics	Made up section	Domestic demand	End stock
1990	277	98	57	122	21	10	35	56	174	8	-	0	5	2	166	103
1994	315	83	39	193	16	22	38	117	234	7	-	0	4	2	227	81
1995	310	81	32	197	20	19	37	222	228	7	0	1	5	1	221	83
1996	310	83	26	201	26	29	37	108	230	8	0	0	5	2	222	80
96/95 %	100	102	80	102	133	158	102	88	101	125	45	60	113	200	100	96

Note : There is discrepancy due to rounding-off to two decimal places

Sources : MAFF, MOF

For clothing uses, Japanese style silk goods such as the Kimono and Obi (including a cloth backing) etc., is about 90%. Consumption of traditional clothing was very strong, but on the other hand, European style silk goods for gentlemen and ladies remained at the 10% level.

Within this European style clothing, men's wear such as suits, sweaters etc. is only a small amount and the most part is occupied by the ladies' wear. The variety of uses in ladies' wear extends over many kinds of articles such as one-piece dress, two-piece dress, coat, blouse, scarf, etc. including knitted sweater. Their consumption decreased to 753 tons in 1994 from 1,152 tons in 1990, the bubble-economy period, however in 1995, it recovered to 783 tons.

Meanwhile, for household articles, silk bedding has taken a major part. However, since 1993 the consumption of silk blankets has increased sharply. Although the absolute amount is still not large, consumption grew from 2 tons in 1990 to 45 tons in 1994, and 48 tons in 1995.

### Raw silk prices

In the summer of 1995, the price of raw silk fell to the 5,000 Yen/kg level, and then the price started to rise from the autumn,

gained strength in early 1996, and in April recorded a 7,900 Yen level. However after this, the price showed fluctuation and began to decline from the September monthly average of 7,850 Yen. In January 1997, it dropped to a 6,000 Yen level, and since then in February and March, it has been hovering around the 5,000 Yen level.

Given this trend in raw silk prices, the government examined the whole situation of raw silk, and held a deliberative council on 19th March 1997 with the committee members from other countries. The result of this deliberation was that the stable zone price of raw silk, decided by the government, was revised downward and adopted as from 1st April of the same year.

As for the revised price, the stabilized standard raw silk price is 5,500 Yen per one kilogram (before revision, 6,000 Yen) for the

standard raw silk (26/28 denier 3A grade), and the upper stabilization range price is 8,700 Yen (9,200 Yen).

After examining the trend of raw silk prices of Japan, the relationship between the fall of Japanese raw silk prices and the international prices (Lyon raw silk price) under the declining tendency of the Yen exchange rate is to be observed. In April 1993, the raw silk price in Japan was 11,565 Yen (average of month) and in Lyon was 4,122 Yen (Chinese raw silk 20/22 d 4A) at an exchange rate of 1 F. Fr.=20.61 Yen, so the gap in raw silk price showed as 2.80 times. After that, the market prices of both Japan and Lyon shifted through repeated and sudden rises and falls. On the whole, the degree of decline was large in the Japanese market, especially since October 1996 when the price continued to fall. On the other hand, the market in

**Table 3. Trend of domestic silk consumption for clothing and family use**

Unit : tons (%)

Item	1990	1993	1994	1995
Total domestic consumption	11791(100)	9659(100)	8971(100)	8828(100)
Clothing use	11656(97,5)	9534(97,0)	8656(96,5)	8518(96,5)
Family use	300(2,5)	287(3,0)	315(3,5)	310(3,5)

Source : Japan Chemical Fibre Association

**Table 4. Change of monthly average raw silk price (Yen/kg)**

Month/Year	1997	1996	1995	1994	1993	96/95
January	5968	7063	7014	7585	10757	•
February	5078	7528	7028	7529	10886	••
March	5379	7323	6138	7822	11113	•
April	5342	7906	6196	8298	11565	•
May		7463	6236	9061	11048	•
June		7342	6711	7565	11130	•
July		7646	5793	7205	10929	•
August		7570	5643	7182	9921	•
September		7850	6753	7148	8583	•
October		6948	7007	7002	7989	•
November		6861	7023	6024	7737	•
December		6118	7036	6585	7808	
Average		7302	6548	7425	9956	112%

Note : Average quotations of spot raw silk of Yokohama and Kobe (26/28,3A)

Source : Materials from Yokohama and Kobe Raw Silk Wholesalers Association

Lyon had a tendency to rise slightly. In addition, due to the influence of the decline of the Yen (in March 1996, about 21.50 Yen), the gap between both markets became very narrow.

Moreover, looking at the Brazilian raw silk price (20/22 d.), on the Lyon market since September 1995, it has been between 30-45 F. Fr. higher than Chinese raw silk, and recently the difference between both countries had a tendency to widen. As a result, the difference between Japanese and Brazilian raw silk (exchange Yen) was 1.56 times in February 1996. However it became 1.20 times in December of the same year, and finally the market price of Brazilian raw silk became higher than the Japanese raw silk price at 0.92 times in February 1997 and 0.95 times in March.

In this overall context, the Chinese government announced that China's cocoon production in 1996 showed a big fall compared

with the previous year. All the parties concerned will be paying more and more attention to world supply and demand of raw silk, and to raw silk prices in the future; in keeping with the trend in China and Brazil.

### Future prospects

The Japanese silk industry has come to depend on imports for up to 96% of domestic demand. However, the present cocoon producing regions, mainly located in the medium mountain area for farming between the flat zone and the mountain area, continue to practice sericulture as an important agricultural activity due to environmental conditions such as weather and land. Also, there are many regions where sericulture occupies an important position in the economic and industrial activities of the surrounding area. For this reason, in these regions it is planned to introduce the newly-developed knowledge and tech-

niques to supplement existing techniques and produce the superior cocoons necessary to manufacture the silk goods required by the end-user and offer the characteristic products which have a high added value, and thus maintain stable cocoon production.

For such activities in the producing areas, the government has given guidance at every stage from cocoon production to silk products, such as the brand cocoon production business, and has given assistance in the form of the necessary funding. However, owing to the weak points of the production structure such as aged workers etc., the prospects for cocoon production in 1997 are most likely to be lower than in the previous year.

On the other hand, for silk products, both Japanese and European styles, although the demand for European style goods has a tendency to increase, the consumption of Japanese style goods such as the Kimono etc. is tending to decline. In addition, the pressure of imports has continued strongly, and it is expected that the price competitiveness of domestic products will become more and more severe. For this reason, attempts are made to cut costs through rationalization by widespread introduction of mechanical power etc. at every stage. It is also striving through friendly relations with other countries to promote the segregation between imported items on the market and development of new products with international competitive power. These efforts will help maintain and develop the domestic silk industry.

(Courtesy: ISA, Newsletter)

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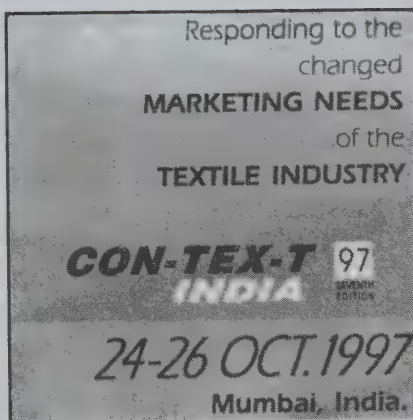
## Con-Tex-T India '97 in Mumbai

The seventh edition of Con-text India, the international textile trade show for fibres, yarns, fabrics, trimmings, embellishments, CAD/CAM and support services, will be organised at Bombay Exhibition Centre (NSE Complex), Mumbai from October 24-26, 1997.

Context India, organised annually since 1991 by the Mumbai based Clothesline group, is being effectively used by the leading creators of fabrics, yarns and trimmings to present their innovations in products, designs and fashions to garment manufacturers, exporters, foreign buyers, fashion designers, distribution channels and institutional buyers. It also serves as an effective marketing and sourcing forum besides providing market and fashion information in advance to the exhibitors and visitors.

The trade show for the first time, will have specialised sections for shirtings, dress materials, prints and processed fabrics, suitings, trousering and outer wear fabrics, high fashion evening wear, fabrics for casual fashion, knitted fabrics, denim, grey goods etc.

Context India will be forecasting fashions for the domestic market for summer '98, with the expertise and market intelligence of 'Promostyl from Paris, France', the world's leading forecasters of fashion, and the prominent Indian fashion designers. Through its tie-up with 'Promostyl', fashion trends specially applied to Indian fabrics and yarns for the Autumn/Winter



1998-99 season will be made available in advance to those exhibitors who cater to the needs of export markets.

'Surat Pavilion', organised by the Southern Gujarat Chamber of Commerce, will project the dynamism and aggressiveness of the Indian synthetic fabric manufacturers. The accent will be on the Surat's diverse capabilities in silk, cotton, printed, woven and man-made fabrics.

A country pavilion from Taiwan, under the auspices of Taiwan Textile Federation, will exhibit a wide range fabrics providing the Indian textile trade an opportunity to view the internationally competitive products and prices.

In short, Context India, '97 will be a reflection of the Indian textile industry's preparedness to face the global competition,

changed market conditions and create demand driven products.

*More details can be obtained from :*

Ms. Veena Sood,  
Asst. Manager-Corporate  
Relations,  
Clothesline Media Pvt. Ltd.,  
Mumbai.  
Tel: 6295302  
Telefax: 633 2556

**Indian Silk** is the best medium to carry your message to the sericulture and silk industry of the country.



## Field Day on Mulberry Cultivation

A Field Day on popularisation of mulberry cultivation was organised at Mawai Haradoipatti village in Bhadohi district by the Purvanchal Sericulture Development Project, Varanasi, U.P., on July 10, 1997. The various cultivation techniques were disseminated to the farmers with the help of video film. The importance of suitable mulberry variety, land levelling, appropriate pruning was stressed for realising the full potential of the garden. The programme was organised in co-ordination with the District Sericulture Office.

**Report : R.K. Pandey, Asst. Director, PSDP, Varanasi.**

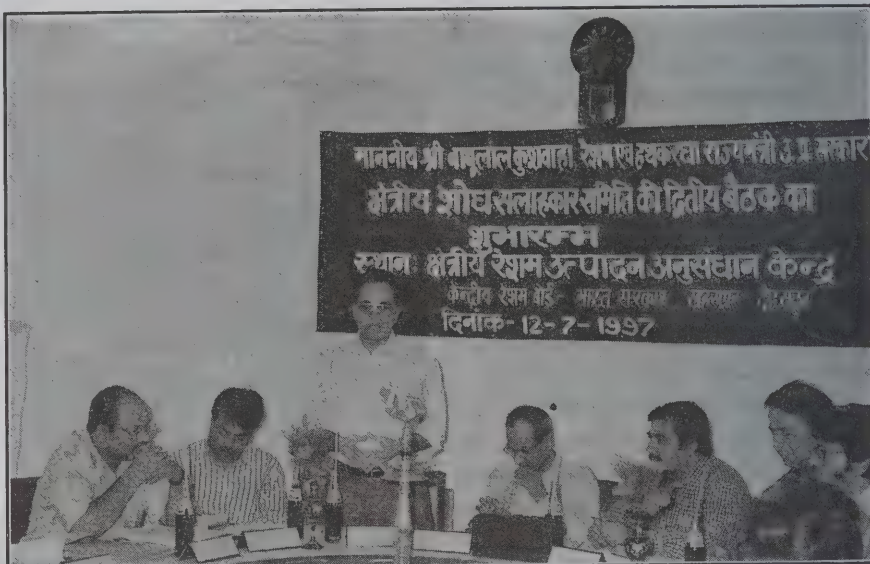
## National Congress on Palynology

A National Congress on 50 years of Indian Palynology is proposed to be held by the Environmental Resources Research Centre, Thiruvananthapuram with the objective of reviewing the progress and also as a part of celebrating the Golden Jubilee of Independence.

*Those interested may contact:*

Dr. P.K.K. Nair,  
Director,  
Environmental Resources  
Research Centre,  
P.B.No. 1230, Peroorkada,  
Thiruvananthapuram,  
KERALA - 695 005

## UP Minister visits RSRS, Sahaspur



**Shri Babu Lal Kushwaha, the Hon'ble Minister of State for Sericulture and Handlooms, U.P. with other dignitaries**

Shri Babu Lal Kushwaha, Hon'ble Minister of State for Sericulture and Handlooms, Govt. of Uttar Pradesh, inaugurated the second meeting of the Regional Research Advisory Committee (RRAC) held at the Regional Sericultural Research Station, Sahaspur, Dehradun, U.P. on July 12, 1997. Dr. Jacob Thomas,

IAS, Chairman, RRAC, presided. The Minister who was apprised of the research findings and working of the RSRS, wanted the state and CSB officials to sericulturally develop the Bundelkhand area on the lines of the Sahaspur area.

**Report : Joint Director, RSRS, Sahaspur, Dehradun (U.P.).**

## International Conference and Exhibition



The International Conference and Exhibition, 1997, organised by the American Association of Textiles Chemists and Colonists

will be held in Atlanta, Georgia, USA from September 28 to October 1, 1997.

The conference will have 18 technical sessions featuring over 70 different formal presentations on Dyeing, Textile Care Developments, Printing, Finishing, New Technologies, Colour Science etc. besides a poster session consisting of 30 posters.

A special tutorial session on 'Basics of Dyeing', taught by Dr. J. Richard Aspland, Professor at Clemson University, will be a special feature of the conference.



## Krishi Mela on Tasar Culture



**Chief guest Shri D. Jayaramappa, RJDS, State Sericulture addressing the gathering**

A one-day Krishi Mela was organised at Mulug village in Warangal district of Andhra Pradesh by the Regional Tasar Research Station (RTRS), Warangal, recently. The objective of the Mela was to bring about an awareness amongst the farmers

about latest technology developed by CTR&TI, Ranchi in tasar culture and to obtain feed back on the problems of rearers. About 200 farmers took part in the programme from different villages.

Shri D. Jayaramappa, Regional Joint Director of Sericulture,

Warangal inaugurated the Mela and rendered an account of the present status of tasar industry in the state. Dr. B.C. Prasad, Dy. Director, CTR&TI, Ranchi who presided, underlined the importance of adopting new technologies for improving qualitative and quantitative production. He also assured the farmers of better dfls. and chawki worms in co-ordination with the state department. Prof. A. Purushottama Rao, Head of Sericulture unit, Kakatiya University, Warangal, inaugurated an exhibition on 'Tasar Silk Industry'.

'Maintenance of Plantation and Rearing Technology' and 'Production of Tasar Eggs' were the themes dealt by subject-experts. 'Story of Tasar' was screened on the occasion. Brochures on maintenance of plantation, new rearing techniques etc. were also distributed.

**Report : A.K. Debnath, SRO, Regional Tasar Research Station, Warangal, A.P.**

## Europe Selection, Hong Kong



Europe selection, held in Hong Kong in conjunction with the Hong Kong Fashion Week from July 16-19, 1997, provided an opportunity for 27 exhibitors to present a total of 38 European fashion

brands in women, men and children's wear, lingerie, beachwear and accessories to the growing Asian market.

The European fashion collections present innovative fabric developments. Handicraft colourings from India, China and Africa gave the collections a powerful look. The organisers of the event, EMI (Ente Moda Italia) and Igodo company, have succeeded in increasing fashion expert to Asia substantially.

The latest Europe selection in January 1997, was attended by more than 5000 trade buyers from nearly 20 countries from Asia and the Pacific.

**Next date: January 14-17, 1998.**

## Pret-a-Porter Fair in Paris

The Indian Silk Export Promotion Council (ISEPC) proposes to participate in the Pret-a-Porter Fair in Paris during September, 1997. This is one of the leading trade fairs for readymade garments and accessories like evening and wedding gowns, cocktail dresses, jackets, skirts, ladies dresses fashion accessories, etc. The council will put up a Generic Promotion Stall or Silk readymade garments and accessories at the fair. The exporters may contact the ISEPC for more details.



## Garment fair at Bangalore



**Shri M.S. Patil, Hon'ble Minister of Textiles, Govt. of Karnataka inaugurates the Garment fair**

A three-day garment fair was organised from July 19 to 25, 1997 in Bangalore by the South India Garments Association. The Fair drew participation from the manufacturers, distributors and representatives from different parts of the country and South India, in particular. The fair was organised with an aim to bring the garment manufacturers and retailers together and to serve as a "show window" so that manufacturers can not only understand the requirements of the retailers in big cities, towns on hamlets but also guide them in the selection of the items taking the market trends into consideration before fashion from metros reaches small towns.

Since garment manufacture is one among the risky businesses, to grab a great grub, a lot depends on the fit, colour, season and fashion, as they find it. There has been a communication gap in the Southern India between the manufacturers and retailers about the trends to follow. Asserts Shri Ram T. Harpalani, the Chairman of the Association that the scientific and

technological development in manufacturing activity has resulted in offering the consumer the best product for his money at a competitive price. The Association has been organised mainly for the domestic trade. "In order to keep pace with the fast changing fashions and designs the conference will be of great help", said Shri Khurshid Alam Khan, Hon'ble Governor of Karnataka, in his message.

The Fair was inaugurated by Shri M.S. Patil, Hon'ble Minister of Textiles, Government of Karnataka.

In this fair, the number of participants from Andhra Pradesh, Tamil Nadu, Kerala, Goa and other states has reached 90.

At display, were more than 150 brands – a whole range of presenting a person in wholesome – right from pants and shirts to ghaghra and choli, necktie and dupatta. True to the demands, garments of cotton and other man-made fibres were many to count but the fair included silk garments as well. At a stall M/s. Silk India

Creations who had come down from Mumbai to participate, tells of the neck-to-neck competition and offers a watchword of caution. The unit at present produces about 300 metres of hand printed items per day for silk shirts in different ranges and of different origins. The representative at the JO's Clothings of Bangalore who deal mainly in silk shirts and ties, tells of their product St. Peter which is moving fast, very next to the big names. It is perfection in weaving, colour combination and finishing along with the quality of silk used that matters in the garment selection.

**Report : Rajesh Kumar Sinha, Indian Silk, Central Silk Board, Bangalore.**

## Indian Products Expo '97 in Singapore

An exhibition entitled 'Indian Products Expo '97' will be held at World Trade Centre, Singapore from September 25-28, 1997. The objective of the exhibition is to bring together the Indian craftsmanship under one roof and displaying it to the world. Singapore being a platform of South-east Asia attracts a lot of buyers from Malaysia, Indonesia, Japan, Vietnam, Taiwan, Brunei, Korea, Cambodia, Australia and New Zealand.

*Further details can be had from:*

Shri Taman Desai,  
Jarana Enterprises,  
Tel. : 022-2104557  
2064865  
Fax. : 022-2084473



# Internationalisation of European Textiles and Clothing Production: Eastern Europe and North Africa

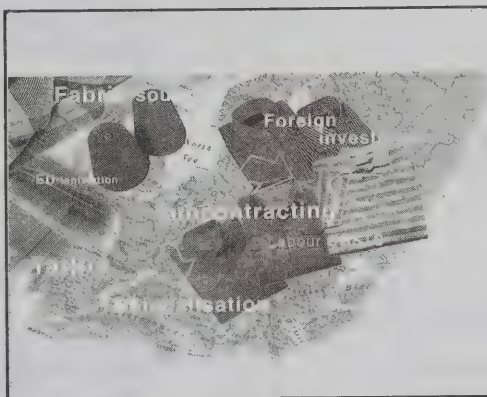
**W**ith the quotas in textiles export slated to go by January, 2005, Asian countries like India will be free to ship as much textiles and clothing to the European Union and the USA as they like.

As the flood gates open, global competition will intensify leading to oversupply and slump in prices. Those who make and market high value but low volume specialities at internationally competitive prices and delivery schedules will remain competitive after 2004 and with a view to this, a number of West European firms are moving operations to North Africa and Eastern Europe where textiles and clothing can be made cost effectively.

'Internationalisation of European Textiles and Clothing Production: Eastern Europe and North Africa' is a special report authored by Marcel Mersch, a researcher and adviser on economic and monetary affairs and industrial policy with the

European Parliament.

The report examines recent economic and political developments in North Africa and Eastern



Europe *vis-a-vis* their prospective impact on investment in these countries, relative competitiveness of textiles and clothing manufacturing in Eastern Europe, North Africa and Asia, mini-profiles of EU companies along with comprehensive data on trade in outward processing, merits of joint ventures and a summary of European Union legislation on outward processing.

The report also answers questions like, will delocalisation guar-

antee survival? which region is the most competitive? what is the future for the Western European textile industry? and a host of allied ones.

Published by the Textiles Intelligence, the report provides vital information about present and future trends for anyone with an involvement in the global fibres, textiles and clothing business—whether as importer/exporter, manufacturer, machinery maker, merchant, retailer, investment analyst or consultant.

*For further details and copies, write to :*

**Textiles Intelligence  
Subscriptions Department,**  
The Economist Intelligence Unit,  
PO Box 200, Harold Hill,  
Romford, RM3 8UX,  
United Kingdom  
Tel : (44.1708) 381444  
Fax : (44.1708) 371 850

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CSB, Bangalore**

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**Attn: Mr. K.B. Rajaneesh**

Tel : 080-3343085

Fax : 080-3369717

# Textile Trade Fairs – 1997

Date	Exhibition	Place
	<b>INDIA</b>	
1997 Oct 24-26	<b>CONTEXT INDIA</b> Fibres, Yarns, Apparel Fabrics, Trimmings & Embellishments, CAD/CAM and Support Services Contact : Clothesline Group, Mumbai – 400 053 Ph : 629 5302, 633 8105 Fax: 91-22-6332556	Mumbai
	<b>OVERSEAS</b>	
1997 Sep 02-05	<b>POZNAN FASHION WEEK</b> Contact : Poznan International Fair, 60-734, Poznan Ph : 692592 Fax: 48-61-665827	Poznan Poland
02-06	<b>ITMEX '97</b> Textile Machinery, Fabrics and Garment Machinery Venue : China Foreign Trade Centre Contact : Business and Indl. Trade Shows, Inc., Wanchai Ph : 8652633 Fax: 8522-8661770	Guangzhou China
03-05	<b>INTERYARN</b> Yarns and Fibres Contact : Messe Frankfurt (HK) Ltd. Wanchai Ph : 8027728 Fax: 8522-5113466	Hong Kong China
05-08	<b>PRET-A-PORTER FEMININ (PAPF)</b> Womens Ready-to-wear and Fashion Accessories Venue : Porte de Versailles Contact : Promosalons, New Delhi Ph : 3317054 Fax: 11-3722666	Paris France
05-09	<b>TITAS '97</b> Fibres, Yarns, Fabrics, Apparel, Accessories, Trim, Technical Textiles Venue : Taipei World Trade Center Contact : CETRA Exhibition Department Ph : 7251111 Fax: 886-2-7251314	Taipei Taiwan
06-08	<b>LYON MODE CITY</b> Lingere, Swimwear, Fabrics and Fittings for Lingerie Contact : Federation de la Maille 92110 Clichy Ph : 47563163 Fax : 33-1-40871622	Lyon France

Date	Exhibition	Place
06-09	<b>INTERNATIONAL FASHION BOUTIQUE</b> Apparel, Accessories and Jewellery Venue : Javit Convention Centre Contact : The Larkin Group, New York, NY 10018 Ph : 5940880 Fax : 1-212-5948556	New York U.S.A.
07-09	<b>STITCHES '97</b> Yarns, Haberdashery, Fabrics, Patterns and Quilting Contact : ICHF Ltd. Dorset BH 23 5HW Ph : 272711 Fax : 44-1425-279369	Birmingham U.K.
09-12	<b>BALTIC TEXTILE AND LEATHER</b> Contact : Messe Frankfurt GmbH, 60327, Frankfurt/Main Ph : 75756711 Fax: 49-69-75756604	Vilnius Lithuania
10-14	<b>TECHNO TMA TEXTIL</b> Textile, Spinning, Weaving Processing and Knitting Machinery Contact : TECHNO TMA/TEXTIL, 40128 Bologna Ph : 28211 Fax : 39-51-282333	Bologna Italy
14-17	<b>TEXPO</b> Textiles, Readymade Garments, Machinery and Accessories Venue : Expo Centre, Sharjah Ph : 391888 Fax : 971-6-392888	Sharjah U.A.E.
16-18	<b>GARMENT AND LEATHER</b> Textiles, Apparel, Leather Technology and Machinery Venue : PWTC Contact : Excel Exhibition, Mumbai – 400 039 Ph : 2873431 Fax : 91-22-2026143	Kuala Lumpur Malaysia
17-19	<b>INTEX '97</b> Woven and Knitted Fabrics, Fibres, Yarns, Grieg Goods Garment Accessories-Buttons, Labels and Laces Venue : Hall 401/402 Singapore Convention and Exhibition Centre Contact : Trade Mart Singapore Pvt. Ltd. Ph : 7306541 Fax : 65-7359970	Suntec City Singapore



# Trade Enquiries

Sl. No.	Importers	Interested in
1.	Mr. Kamol Phichitsingh, C/o M/s. Lucky Impex L.P. 49-51-53, Trok Chum Sampent, Bangkok 10100 Tel : 2249767, 2254440	Textiles
2.	Lares International B-21, Anu Building Subway Road Santacruz, Bombay - 400 054 Tel : 00 91 22 6100577 Fax : 00 91 22 6100577	Readymade garments
3.	J.D. & Sons P.O. Box No. 57358, Andheri (w), Mumbai - 400 058 Tel : 00 91 22 6177145 Fax : 00 91 22 6184040	Textiles, garments
4.	Swastik Enterprises Gopal Katra, CK 20/36, Chowk, Varanasi - 221 001 Tel : 00 91 542 321921 Fax : 00 91 542 310856	Silk materials
5.	Shri S.K. Bansal General Industries S-252, Greater Kailash - I, New Delhi - 110048 Tel : 00 91 11 6484152 Fax : 00 91 11 6430215	Readymade garments
6.	Greenstar International Pvt Ltd P.O. Box No. 84, Khairatabad, Hyderabad - 50004 Tel : 00 91 40 3394410 Fax : 00 91 40 3391219	textiles
7.	Aspinwall & Co (Tranvancore) Ltd P O Box 5, Alleppey - 688 001 Tel : 00 91 477 243601 Fax : 00 91 477 243143	Automatic weaving looms
8.	Tino Import/Export, Ida P.O. Box 9, 3750 Macinhata do Vouga Tel : 351 34 571090 Fax : 351 34 571560	Home textiles
9.	Hortenses Av. 1 Maio 14, 1B 2500 Caldas da Rainha, Lisbon, Portugal Tel : 351 62 842904 Fax : 351 62 831663	Silk
10.	A.D.P. Armazens do Povo, SARL Av. Almícar Cabral, 5, Bissau, Lisbon, Portugal Tel : 00 245 201247	Silk fibres

# पूर्वांचल रेशम परियोजना - समीक्षा एवं सम्भावनाएं

सत्यभान सारस्वत, राजेन्द्र कुमार, राकेश पाँडे एवं गार्गी

**उ**त्तर प्रदेश के पूर्वी क्षेत्रों के वे जिले जो बिहार की सीमा से लगे हैं, उन सबको मिलाकर एक नाम दिया गया है, पूर्वांचल। इस क्षेत्र में साड़ी उद्योग से हजारों परिवार जुड़े हैं। पूर्वांचल के अर्न्तगत बनारस, जौनपुर, गाजीपुर, भदोही, बलिया आदि जिले आते हैं, किन्तु बनारस ही पूर्वांचल का मुख्य केन्द्र है।

## परियोजना का शुभारम्भ

उत्तर प्रदेश के उत्तराखण्ड में रेशम उत्पादन का इतिहास शताब्दियों पुराना है, किन्तु आजादी के उपरान्त इस

देश में रेशम के कुल उत्पादन में वृद्धि के लिए उत्पादन क्षेत्र का विस्तार भी आवश्यक है। कन्तु, जलवायु व भौगोलिक उपयुक्तता के मद्देनजर पूर्वांचल के रेशम परियोजना के सूत्रपात से एक ओर इस क्षेत्र में संभावनाओं के साकार होने तो दूसरी ओर स्थानीय रेशम उद्योग के पुनरुद्धार के आशा की किरणें अभी से दीख रही हैं।



चित्र 1. शहतूत टहनियों पर कोसा-सृजन



चित्र 2. प्रशिक्षण के दौरान वीडियो फिल्म पर विभिन्न तकनीकों का प्रदर्शन

कार्यकलाप को सुव्यवस्थित रूप देने के लिए वर्ष 1948 में डोईवाला (देहरादून) में राज्य सरकार ने अपना पहला रेशम उत्पादन प्रक्षेत्र बनाया। कालान्तर में, राज्य में अनेक प्रक्षेत्र बनाये गए तथा मात्र देहरादून जनपद में गत वर्ष 90,000 किग्रा. कच्चे रेशम कोसों का उत्पादन हुआ।

पूर्वी उत्तर प्रदेश में रेशम उत्पादन के सामुदायिक उत्पादन हेतु 1980 के दशक में "तराई रेशम परियोजना" प्रारम्भ की गई जिसका मुख्यालय गोरखपुर था। इस योजना की अल्पकालीन सफलता को देखते हुए राज्य सरकार एवं केन्द्रीय रेशम बोर्ड ने 1993 से संयुक्त रूप से पूर्वांचल रेशम विकास परियोजना प्रारम्भ की है। इस पंचवर्षीय योजना में तीन जिलों वाराणसी, गाजीपुर तथा भदोही में 3000 एकड़ में शहतूत रोपण का लक्ष्य रखा गया।

इस क्षेत्र में जमीन उपजाऊ तथा सिंचाई के साधन भरपूर हैं। सिंचाई हेतु नदियों के जल की पर्याप्त व्यवस्था है। अनुसन्धान एवं विकास कार्य केन्द्रीय रेशम बोर्ड व विस्तार कार्य राज्य सरकार की संस्थाओं द्वारा सम्पादित किया जा रहा है। केन्द्रीय रेशम बोर्ड ने परियोजना को अनुसंधान एवं



# पूर्वाचल में रेशम प्रशिक्षण

**के**न्द्रीय रेशम बोर्ड के तत्वाधान में पूर्वी उत्तर प्रदेश में उच्च कोटि के रेशम उत्पादन की संभावना को दृष्टिगत रखते हुए, पूर्वाचल रेशम विकास परियोजना के अन्तर्गत वाराणसी एवं गाजीपुर जिलों के कृषकों को शहतूत वृक्षारोपण एवं रेशमकीट पालन में प्रशिक्षित करना महत्वपूर्ण माना गया।

इस कार्यक्रम के अन्तर्गत रेशम विभाग द्वारा नामित ऐसे कृषकों को जिनके पास शहतूत के बागान हैं या वे इच्छुक हों, उनके गाँव में ही प्रशिक्षण प्रदान किया जाता है। परियोजना के प्रावधान के अनुरूप 300 कृषकों को वर्ष 95-97 के दौरान प्रशिक्षित किया गया जिसके साथ प्रशिक्षण भत्ते की भी व्यवस्था थी।

पूर्वाचल में रेशमकीट पालन से अधिक लाभ की प्राप्ति के लिए कृषकों को कम-से-कम एक एकड़ भूमि में बोर्ड द्वारा विकसित शहतूत की उन्नत किस्मों जैसे कन्वा-2, एस-1635, एस-146 के पौधे लगाने हेतु प्रोत्साहित किया जाता है।

## प्रशिक्षण पाठ्यक्रम

पाठ्यक्रम के अधीन संबंधित विभिन्न क्षेत्रों में प्रशिक्षण प्रदान किया गया :

1. शहतूत पौधशाला की स्थापना तथा रखरखाव;
2. शहतूत के बागान की स्थापना तथा उत्तम पत्तियों के पैदावार हेतु उसका रखरखाव;
3. कीटों तथा रोगों से शहतूत के पौधों का बचाव;
4. कीटपालन गृह तथा उपकरणों का निसंक्रमण;
5. कीटपालन की उन्नत तकनीकी;
6. रेशमकीट के रोगों से बचाव, रेशमकीट औषध एवं लेबेक्स पाउडर का प्रयोग;
7. रेशमकीट पालन में विकल्प के रूप में उपलब्ध स्थानीय संसाधनों का प्रयोग, एवं
8. रेशम उद्योग से होने वाली वार्षिक आय।

## कीटपालन का प्रदर्शन

प्रशिक्षण की 45 दिनों की अवधि के दौरान कृषकों को कीटपालन की उन्नत तकनीकी के संबंध में जानकारी दी

जाती है। तापमान एवं आर्द्रता के अनुरूप उचित रेशमकीट संकरों की उपयोगिता पर बल दिया जाता है।

**तालिका : प्रदर्शन के दौरान विभिन्न संकर नस्लों का निष्पादन**

मौसम	प्रजातियाँ/संकर	प्रदर्शित उत्पादकता प्रति एकड़ (किग्रा.)
वसंत	द्विप्रज संकर	63
ग्रीष्म	बहु एवं द्विप्रज संयोजित	58
मानसून	बहु एवं द्विप्रज संयोजित	112
पतझड़	द्विप्रज संकर	92

इस प्रकार, वर्ष में चार बार रेशमकीट पालन से 325 किग्रा. कोसों की फसल सुनिश्चित है।

वर्ष के विभिन्न मौसमों में रासायनिक उर्वरक व सड़ी गोबर की खाद के अनुप्रयोग से होनेवाले लाभ के संबंध में भी जानकारी दी जाती है। शहतूत बाग को झाड़ी के रूप में रखने के लिए मानसून के आगमन पर जमीन से एक फूट की ऊँचाई पर एवं शरद ऋतु में जमीन से दो फूट की ऊँचाई पर काटने-छाँटने का भी प्रशिक्षण दिया जाता है।

## सूखे बाँस की पत्तियों में कोसा-सृजन

प्रशिक्षण के दौरान गांव में उपलब्ध बाँस की सूखी पत्तियों के बीच कोसाकरण का प्रदर्शन किया जाता है। इन पत्तियों को धूप में अच्छी तरह सुखाकर कीटपालन ट्रे में व्यवस्थित कर दिया जाता है। बाँस की पत्तियों में बने कोसों की गुणवत्ता में धागाकरण की दृष्टि से अन्तर नहीं पड़ता है। इस प्रकार, घरेलू संसाधनों का लाभदायक उपयोग भी हो जाता है।

प्रशिक्षण के दौरान कृषकों को शहतूत पौधरोपण के साथ, ग्रीष्म में उड़द व मूंग, वर्षा में मक्का, उड़द व मूंग एवं शरद में शीतकालीन सब्जियों की अर्न्तफसलों के लिए भी प्रोत्साहित किया जाता है जिससे कृषकों के आय में पर्याप्ततः वृद्धि संभव है।

राकेश कुमार पाण्डेय, राजेन्द्र कुमार, गार्गी एवं सत्यभान सारस्वत  
(शेष पृष्ठ 53 पर)

# शहतूत सस्यावशेषों से कार्बनिक खाद का निर्माण

नरपतराज सिंघवी, दिनेश दत्त शर्मा एवं रजत कुमार दत्ता

**श**हतूत पौधों से पत्तों की संतोषजनक प्राप्ति के लिए मृदा का उर्वर तथा उपजाऊ होना अति आवश्यक है। लगातार फसलोत्पादन से मिट्टी में उपलब्ध आवश्यक पोषक तत्वों की बहुत अधिक हानि होती है जिसकी प्रति पूर्ति प्रत्येक फसल में खाद व रासायनिक उर्वरकों द्वारा करनी पड़ती है। सघन खेती व अधिक उपज देने वाली शहतूत किस्मों के कारण भूमि का दोहन बढ़ गया है जिसके परिणामस्वरूप नाइट्रोजन की सार्वभौमिक कमी, फास्फोरस, पोटैशियम तथा कुछ सूक्ष्म पोषक तत्वों की कमी, समुचित फसल उत्पादन में बाधक बन गयी है।

**शहतूत पत्तों की गुणवत्ता व उत्पादकता पर मृदा की उर्वरता का प्रभाव स्पष्ट है। गत वर्षों में रासायनिक उर्वरकों के अनुप्रयोग से कुल उत्पादन में वृद्धि अवश्य हुई है किन्तु भूमि के पोषक तत्वों का दोहन भी बहुत अधिक हुआ है। इस परिपेक्ष्य में, कार्बनिक खाद के निर्माण हेतु शहतूत के सस्यावशेष उपयोगी सिद्ध हो सकते हैं।**

मिट्टी में विद्यमान कार्बनिक पदार्थ इसकी भौतिक रचना, गुण एवं उर्वरा शक्ति का मेरूदंड हैं। कार्बनिक खाद न केवल आवश्यक खाद्य तत्वों को मिट्टी में बढ़ाते हैं बल्कि पौधों के द्वारा इनको ग्रहण करने का वातावरण भी बनाए रखते हैं।

वर्तमान में, रासायनिक उर्वरकों के मूल्य तेजी से बढ़े हैं तथा रेशम कृषक इन उर्वरकों का समुचित मात्रा में प्रयोग करने में स्वयं को असमर्थ पा रहे हैं। ऐसी परिस्थितियों में, विकल्प के रूप में वे ज्यादा से ज्यादा मात्रा में कार्बनिक खाद का निर्माण व उपयोग करें जिससे मृदा में जीवांश की मात्रा बढ़े, मृदा की भौतिक दशा में सुधार हो तथा उसमें

पोषक तत्वों की उपलब्धता बढ़े।

हमारे देश में, रेशम कृषक शहतूत सस्यावशेषों (रेशमकीट पालन के पश्चात् पौधों पर बची हुई शेष पत्तियाँ तथा छँटाई से प्राप्त तने) का उपयोग मृदा में जीवांश तथा पोषक तत्वों की मात्रा बढ़ाने के बदले कुछ भाग ईंधन के रूप में करते हैं तथा कुछ भाग पशुओं को खिला देते हैं।

इन सस्यावशेषों में पौधों की वृद्धि एवं पैदावार के लिए आवश्यक तत्व पाये जाते हैं। सस्यावशेषों के रासायनिक विश्लेषणों से ज्ञात हुआ है कि शहतूत की सूखी पत्तियों में 2.4 से 4.4 प्रतिशत नाइट्रोजन, 0.23 से 0.97 प्रतिशत फास्फोरस व 0.93 से 3.19 प्रतिशत पोटाश पाया जाता है तथा सूखे तनों में भी काफी मात्रा में पोषक तत्व पाए जाते हैं। इससे अनुमान लगाया जा सकता है कि सस्यावशेषों से निर्मित कार्बनिक खाद के उपयोग द्वारा रेशम कृषक कितनी मात्रा में मृदा में शहतूत पौधों के लिए आवश्यक विभिन्न तत्वों की पूर्ति कर सकते हैं। अतः, वांछनीय है कि रेशम कृषक सस्यावशेषों का उपयोग जलावन हेतु करने की अपेक्षा उनसे कार्बनिक खाद तैयार करें।

कुछ रेशम कृषकों का मत है कि सस्यावशेषों को सीधा खेतों में डाल दिया जाए जबकि हमारे देश की जलवायु व सिंचाई की सुविधाओं को ध्यान में रखते हुए सस्यावशेषों से कार्बनिक खाद तैयार करना बेहतर है क्योंकि सस्यावशेषों में औसतन कार्बन व नाइट्रोजन का अनुपात लगभग 40:1 से लेकर 50:1 होता है जो मृदा व फसल दोनों ही के लिए उपयुक्त नहीं होता तथा इसके विच्छेदन के लिए 50 प्रतिशत नमी की आवश्यकता होती है। यदि सस्यावशेष सीधे खेत में डाल दिए जाएं तो इनके विघटन हेतु, विघटनकारी सूक्ष्म जीवाणु भूमि में उपलब्ध नाइट्रोजन का उपयोग करते हैं जिससे शहतूत फसल को मृदा से प्राप्त होनेवाली नाइट्रोजन में कमी आ सकती है।



## कम्पोस्ट खाद हेतु उपयोग

सस्यावशेषों से कम्पोस्ट खाद बनाने हेतु सर्वप्रथम 6 फीट लम्बा, इतना ही चौड़ा एवं 3 फीट गहरा गड्ढा खोदकर उसके भीतर की मिट्टी को अच्छी तरह दबा देना चाहिए। तत्पश्चात्, गड्ढे में रेशमकीट पालन के पश्चात् पौधों पर बची हुई पत्तियों एवं छँटाई से प्राप्त तनों को छोटे-छोटे टुकड़ों में काट कर डाल देना चाहिए। सख्त तनों को भिगोकर काटा जा सकता है। साथ ही, ऐसे सभी पदार्थों को भी जो सड़-गल सकते हों, कार्बनिक खाद बनाने के काम में लिया जा सकता है। इसके अलावा, कचरा, मिट्टी, घास, खरपतवार जिसमें बीज न बने हों, आदि भी कार्बनिक खाद बनाने के लिए उपयोग में लाए जा सकते हैं। सस्यावशेषों की उपलब्धता के आधार पर गड्ढों का आकार बदला जा सकता है। सस्यावशेषों की तह तब तक लगाया जाए जब तक गड्ढा भर न जाए। गड्ढे में नमी बनाए रखने के लिए उसमें समय-समय पर पानी छिड़कते रहना चाहिए। गड्ढा भरने के बाद उसे मिट्टी से ढक देना

चाहिए तथा क्रमशः 15, 30 व 60 दिनों के अंतराल पर गड्ढे के अंदर पड़े सस्यावशेषों को तीन बार पलटना चाहिए। इसके बाद आवश्यकता हो तो इन्हें फिर पलटें। जब सस्यावशेषों से बनी कम्पोस्ट खाद का रंग गहरा भूरा हो जाए तो समझ लेना चाहिए कि खाद उपयोग के लिए तैयार है। इसमें लगभग 3-4 माह लगते हैं। इस कम्पोस्ट खाद को शहतूत वाटिकाओं में 20 टन/हेक्टर/वर्ष की दर से दो खुराकों में 6 महीने के अंतराल पर डालना चाहिए। इसके बाद मिट्टी में इसे अच्छी प्रकार मिला देना चाहिए। खाद को खेत में खुले ढेर बनाकर नहीं छोड़ना चाहिए क्योंकि इससे कम्पोस्ट खाद की गुणवत्ता में कमी आ जाती है। समुचित ढंग से तैयार कार्बनिक खाद में नाइट्रोजन की मात्रा 0.6 से 0.8 प्रतिशत तक हो सकती है और यह खाद शहतूत खेत की उर्वरता प्रबंधन में बहुमूल्य सिद्ध हो सकती है।

*लेखकगण केन्द्रीय रेशम उत्पादन अनुसंधान व प्रशिक्षण संस्थान, मैसूर में कार्यरत हैं।*

(पृष्ठ 51 से जारी)

## पूर्वांचल रेशम परियोजना - समीक्षा एवं सम्भावनाएं

तकनीकी सुदृढ़ आधार देने के लिए वाराणसी में अनुसन्धान विस्तार केन्द्र/बीजोत्पादन प्रक्षेत्र की स्थापना की है जहाँ 12-15 शहतूत की प्रजातियाँ उपलब्ध हैं तथा विभिन्न रेशमकीट की जातियों की स्थानीय उपयोगिता हेतु परीक्षण का कार्य होता है।

केन्द्रीय रेशम बोर्ड, पूरे पूर्वांचल परियोजना क्षेत्र के लिए उपयुक्त रेशमकीट बीजों की आपूर्ति के साथ-साथ चाकी कीटपालन का कार्य भी कर रहा है। प्रशिक्षण के बिना रेशमकीट पालन व रेशम उद्योग अत्यन्त कठिन है। अतः, बोर्ड प्रतिवर्ष 300 लाभान्वित किसानों के स्थानीय प्रशिक्षण के साथ-साथ रेशम उत्पादक राज्यों का भ्रमण-दौरा भी आयोजित कर रहा है।

## समस्याएं

जहाँ कृषियोग्य उपजाऊ भूमि इस परियोजना के क्षेत्र में उपलब्ध है तो तुलनात्मक फसल लेकर किसानों को लाभ दिलाना एक कड़ी चुनौती है। स्थानीय किसान परम्परागत पीढ़ी-दर-पीढ़ी से खेतीबारी का कार्य करते आ रहे हैं;

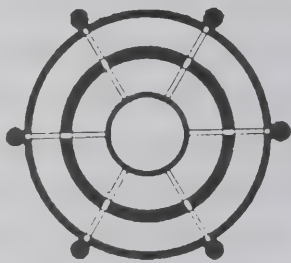
अर्थात् खरीफ में ज्वार-बाजरा तो रबी में गेहूँ-चना। उन किसानों को परम्परा से हटाकर रेशम उत्पादन की ओर आकर्षित होने में समय लगना स्वाभाविक है। दक्षिण रेशम उत्पादक राज्यों जैसे कर्नाटक, आन्ध्र प्रदेश की तरह यहाँ कोसा-बाजार का अभाव-जैसा है जिससे किसानों को कोसों की बिक्री में असुविधा का सामना करना पड़ रहा है।

एक अन्य समस्या है, रेशमकीट पालन का समय व कृषि फसलों का समय लगभग साथ-साथ होना। इसलिए किसानों को अन्य कृषि फसलों को प्राथमिकता देना पड़ता है।

## संभावनाएं

3000 एकड़ में शहतूत रोपण होने से कम-से-कम 30,000 व्यक्तियों को योजनापरान्त रोजगार उपलब्ध हो सकता है। कच्चे रेशम की खपत के लिए वाराणसी के "बनारसी साड़ी" के बुनकरों की संख्या हजारों में होगी अर्थात् स्थानीय व्यापार को योजना का लाभ प्राप्त होगा।

*लेखकगण पूर्वांचल रेशम विकास परियोजना, केन्द्रीय रेशम बोर्ड, वाराणसी में कार्यरत हैं।*



# Exports Review

Foreign exchange earnings of the Indian Silk Industry during the month of June '97 amounted to Rs. 5882 lakh compared to Rs. 5712.89 lakh during June '96 and registered an increase of 3%.

## Review of Silkgoods Certified for Exports

During June 1997 and First Quarter of the year 1997-98

TABLE - I

### Export Performance of Indian Silk Industry

(Unit : Lakh ; Qty : Silkgoods ; Sq. Mtrs. ; Silkyarn/Silkwaste : Kg ; Value : Rs.)

Item of Export	June				% Increase		April to June				% Increase	
	1997		1996				1997		1996			
	Qty.	Value	Qty.	Value	Qty.	Value	Qty	Value	Qty.	Value	Qty.	Value
A. Silkgoods :												
(1) Mulberry												
(i) Dress Material	13.93	2557.64	13.38	2232.29	4.1	14.6	44.05	7830.97	42.13	6852.36	4.6	14.3
(ii) Readymade Garments	2.96	842.65	6.62	1460.75	-55.3	-42.3	7.86	3070.05	16.19	3535.37	-51.5	-13.2
(iii) Carpets	0.05	412.01	0.04	284.74	25.0	44.7	0.19	1833.47	0.20	1658.03	-5.0	10.6
(iv) Sarees	2.40	541.23	3.04	505.06	-21.1	7.2	7.47	1498.71	9.53	1616.17	-21.6	-7.3
(v) Scarves/stoles	5.25	562.34	5.07	482.39	3.6	16.6	14.36	1402.18	16.29	1512.74	-11.8	-7.3
(vi) Others	1.98	427.52	2.51	438.78	-21.1	-2.6	5.82	1357.10	8.36	1288.47	-30.4	5.3
Mulberry Total [i to vi]	26.57	5343.39	30.66	5404.01	-13.3	-1.1	79.75	16992.48	92.70	16463.14	-14.0	3.2
(2) Tasar	0.52	98.37	0.60	120.18	-13.3	-18.1	1.99	316.86	2.73	483.74	-27.1	-34.5
Total [1+2]@	27.09	5441.76	31.26	5524.19	-13.3	-1.5	81.74	17309.34	95.43	16946.88	-14.3	2.1
(3) Mixed/Blended	2.18	304.44	1.79	179.81	21.8	69.3	5.47	742.79	5.44	549.76	0.6	35.1
Total [1+2+3]	29.27	5746.20	33.05	5704.00	-11.4	0.7	87.21	18052.13	100.87	17496.64	-13.5	3.2
B. SILKYARN	0.01	7.44	0.01	8.89		-16.3	0.01	7.44	0.03	24.82		
C. SILKWASTE	0.78	128.36	-	-			1.26	206.62	0.04	5.98		
TOTAL [A+B+C]		5882.00		5712.89		3.0		18266.19		17527.44		4.2

@ Refers to total natural silk goods exports.

During first quarter of the year 1997-98 foreign exchange earnings from silk goods certified for exports amounted to Rs. 18266.19 lakh as against Rs. 17527.44 lakh during the corresponding period of previous year and reflected an

increase of 4.2%.

Data on itemwise silkgoods certified for exports by Central Silk Board are given in Table - I.

Comparative data on region-wise silkgoods certified for exports are given in Table-II.

### Natural silkgoods

During the month of June '97, the natural silkgoods certified for exports amounted to 27.09 lakh sq. mtrs valued at Rs. 5441.76 lakh as against 31.26 lakh sq. mtrs. valued at Rs. 5524.19 lakh

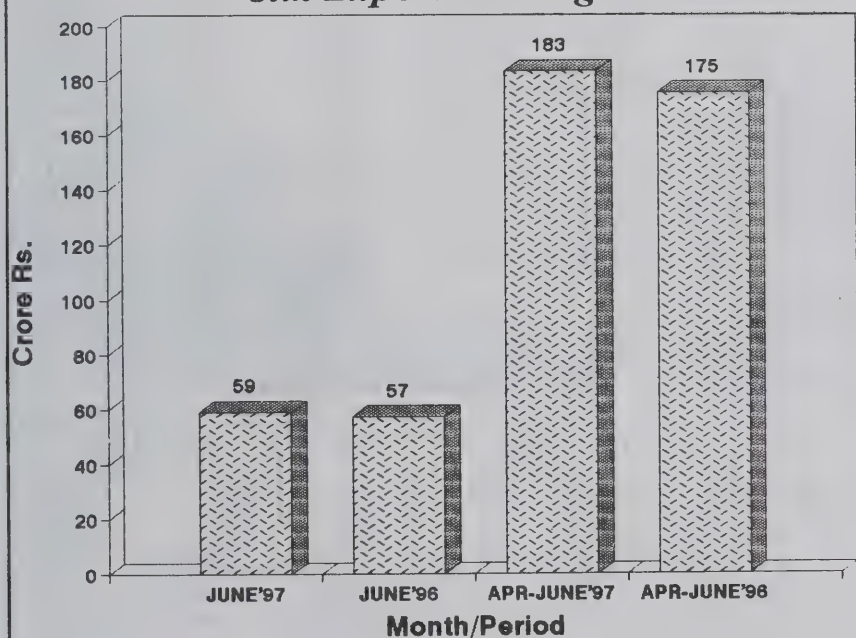


**Table - II**  
**Regionwise Silkgoods certified for exports**

[Unit:Lakh;Qty:Sq.mtrs;Value:Rs.]

Region	June						April to June					
	1997		1996		% Increase		1997-98		1996-97		% Increase	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
West Europe	13.82	2660.43	14.83	2455.55	-6.8	8.3	39.78	7921.18	44.50	7778.09	-10.6	1.8
U.S.A. & Others	9.28	2062.14	11.75	2297.24	-21.0	-10.2	26.49	6814.30	33.79	6573.29	-21.6	3.7
Asia	4.82	722.47	5.14	673.58	-6.2	7.3	16.69	2420.57	18.07	2286.64	-7.6	5.9
Japan & Others	0.67	143.35	0.73	169.87	-8.2	-15.6	1.81	415.51	1.94	421.07	-6.7	-1.3
Africa	0.59	147.73	0.37	73.48	59.5	101.0	1.51	363.19	1.89	348.01	-20.1	4.4
East Europe	0.09	10.08	0.23	34.28	-60.9	-70.6	0.93	116.67	0.68	89.54	36.8	30.3
Total	29.27	5746.20	33.05	5704.00	-11.4	0.7	87.21	18051.42	100.87	17496.64	-13.5	3.2

**Silk Export Earnings**



during the corresponding month of previous year.

During first quarter of the year 1997-98, the aggregate natural silk goods certified for exports amounted to 81.74 lakh sq. mtrs. valued at Rs. 17309.34 lakh as against 95.43 lakh sq. mtrs. valued at Rs. 16946.88 lakh during the corresponding period of preceding year.

#### **Mulberry silkgoods**

During June '97, mulberry silkgoods certified for exports

amounted to 26.57 lakh sq.mtrs valued at Rs. 5343.39 lakh as against 30.66 lakh sq. mtrs. valued at Rs. 5404.01 lakh during June '96.

During first quarter of the year 1997-98, mulberry silkgoods certified for exports amounted to 79.75 lakh sq. mtrs. valued at Rs. 16992.48 lakh compared with 92.70 lakh sq. mtrs. valued at Rs. 16463.14 lakh during the corresponding period of 1996-97 and inspite of slump in quantum exports, it showed an increase of

3.2% in value. Out of the total natural silk goods certified for exports, the share of mulberry silkgoods roughly amounted to 98% both in quantity and value respectively.

Countrywise data of mulberry silkgoods certified for exports is given in Table - III.

#### **Varietywise mulberry silkgoods**

During the first quarter of the year 1997-98, among the various varieties of mulberry silk goods certified for exports, dress materials ranked first followed by readymade garments, carpets, sarees and scarves/stoles. Data of varietywise mulberry silkgoods certified for exports are given in Table -I.

#### **Tasar silkgoods**

During June '97, tasar silkgoods certified for exports amounted to 0.52 lakh sq.mtrs valued at Rs. 98.37 lakh compared with 0.60 lakh sq.mtrs valued at Rs. 120.18 lakh during June '96.

During first quarter of the year 1997-98, a total quantity of 1.99 lakh sq. mtrs. of tasar silkgoods valued at Rs. 316.86 lakh were certified for exports as against

**Table - III**  
**Foreign Exchange Earnings from Mulberry Silkgoods Certified for Exports**  
(Rs. in Lakh)

Country @	June		%	April to June		%	Country Share Percentage in	
	1997	1996		1997	1996		1997	1996
U.S.A.	1623.19	1939.25	-16.3	5749.86	5436.21	5.8	33.8	33.0
Germany	869.59	822.40	5.7	2731.39	2760.33	-1.0	16.1	16.8
U. K.	709.84	703.68	0.9	1987.01	1912.70	3.9	11.7	11.6
France	208.29	120.55	72.8	764.17	618.37	23.6	4.5	3.8
U.A.E.	183.68	171.54	7.1	647.78	576.99	12.3	3.8	3.5
Canada	270.37	154.06	75.5	601.01	586.97	2.4	3.5	3.6
Italy	190.73	175.20	8.9	519.79	527.59	-1.5	3.1	3.2
Netherlands	128.87	136.77	-5.8	380.17	376.87	0.9	2.2	2.3
Hong Kong	83.89	88.51	-5.2	342.62	298.88	14.6	2.0	1.8
Singapore	75.88	124.76	-39.2	254.62	324.91	-21.6	1.5	2.0
Australia	89.10	109.17	-18.4	252.83	247.92	2.0	1.5	1.5
Switzerland	95.07	47.04	102.1	232.14	257.21	-9.7	1.4	1.6
Portugal	60.67	85.62	-29.1	180.34	169.79	6.2	1.1	1.0
Denmark	60.42	56.28	7.4	163.53	149.66	9.3	1.0	0.9
Austria	47.56	34.93	36.2	158.53	132.91	19.3	0.9	0.8
Spain	53.10	74.11	-28.3	155.27	188.01	-17.4	0.9	1.1
Brazil	52.48	58.10	-9.7	136.07	95.48	42.5	0.8	0.6
Belgium	44.49	32.40	37.3	126.02	148.94	-15.4	0.7	0.9
Oman	72.93	10.01	628.6	115.19	124.88	-7.8	0.7	0.8
South Africa	53.29	25.72	107.2	115.08	89.60	28.4	0.7	0.5
Others	369.95	433.91	-14.7	1379.06	1438.92	-4.2	8.1	8.7
Total	5343.39	5404.01	-1.1	16992.48	16463.14	3.2	100.0	100.0

@ Refers to top 20 importing countries

**Table - IV**  
**Foreign Exchange Earnings from Tasar Silkgoods Certified for Exports**  
(Rs. in Lakh)

Country @	June		%	April to June		%	Country Share Percentage in	
	1997	1996		1997	1996		1997	1996
Germany	13.73	22.83	-39.9	58.47	91.44	-36.1	18.5	18.9
U.S.A.	27.11	29.21	-7.2	57.26	114.78	-50.1	18.1	23.7
Brazil	3.38	1.32	156.1	22.74	5.05	350.3	7.2	1.0
Hong Kong	6.87	-	-	21.95	0.46	4671.7	6.9	0.1
U.A.E.	6.99	19.63	-64.4	20.64	62.39	-66.9	6.5	12.9
Turkey	-	0.56	-100.0	14.30	1.46	879.5	4.5	0.3
France	9.06	3.97	128.2	14.09	15.11	-6.8	4.4	3.1
Italy	8.82	11.26	-21.7	14.02	15.37	-8.8	4.4	3.2
Saudi Arabia	-	-	-	11.33	4.19	170.4	3.6	0.9
Belgium	1.31	0.70	87.1	9.71	2.71	258.3	3.1	0.6
Colombia	-	-	-	9.60	-	-	3.0	0.0
U.K.	3.61	6.69	-46.0	9.15	32.84	-72.1	2.9	6.8
Spain	6.65	0.71	836.6	8.43	7.38	14.2	2.7	1.5
Japan	3.17	9.18	-65.5	8.01	13.68	-41.4	2.5	2.8
South Africa	0.46	-	-	6.93	5.58	24.2	2.2	1.2
Chile	-	-	-	6.85	4.29	59.7	2.2	0.9
Canada	-	3.85	-100.0	4.11	20.02	-79.5	1.3	4.1
Kuwait	1.47	-	-	3.89	9.64	-59.6	1.2	2.0
Switzerland	0.08	2.04	-96.1	3.59	2.72	24.6	1.1	0.6
Netherlands	2.35	2.92	-19.5	2.52	3.27	-22.9	0.8	0.7
Others	3.31	5.31	-37.7	9.47	71.36	-86.7	3.0	14.8
Total	98.37	120.18	-18.1	316.86	483.74	-34.5	100.0	100.0

@ Refers to top 20 importing countries

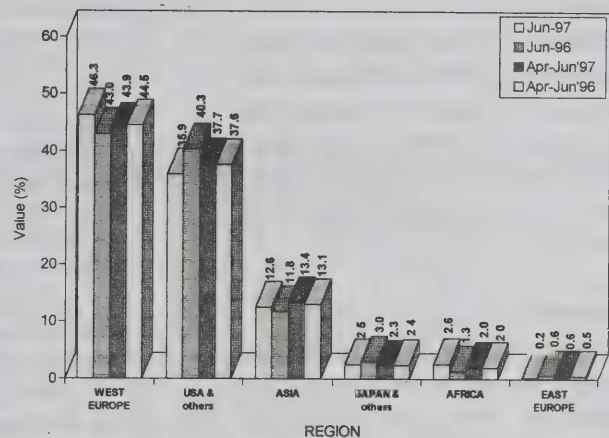
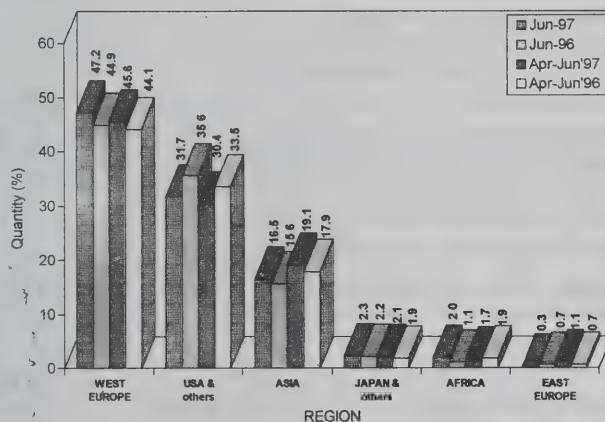


**Table V**  
**Unit Export Price**

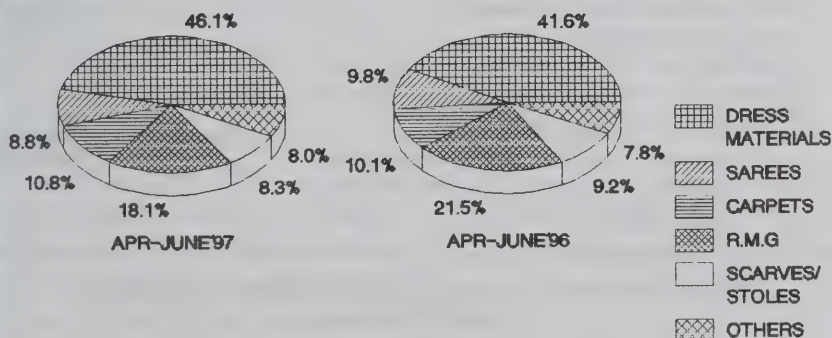
(Rs. per Sq.mtr.)

Item	June			April-June		
	1997	1996	% Increase	1997	1996	% Increase
<b>A. Mulberry Silkgoods</b>						
1. Excl. Carpets	185.91	167.19	11.2	190.53	160.07	19.0
2. Incl. Carpets	201.09	176.26	14.1	213.06	177.60	20.0
3. Carpets	8950.90	7042.91	27.1	9464.54	8093.09	16.9
<b>B. Tasar Silkgoods</b>	189.64	199.69	-5.0	159.48	177.00	-9.9

### REGION-WISE SILKGOODS CERTIFIED FOR EXPORTS



### Share percentage of Varietywise Mulberry Silkgoods Export Earnings



2.73 lakh sq. mtrs valued at Rs. 483.74 lakh during the corresponding period of previous year.

Countrywise data of tasar silkgoods certified for exports are given in Table-IV.

#### Unit export price

The unit export price realised for mulberry and tasar silkgoods during June '97 and first quarter of the year 1997-98 alongwith comparative data of previous year are given in Table-V.

#### Mixed or blended silkgoods

During June '97, mixed/ blended silkgoods certified for exports amounted to 2.18 lakh

sq.mtrs valued at Rs. 304.44 lakh compared with 1.79 lakh sq. mtrs. valued at Rs. 179.81 lakh during June '96 and showed a perceptive increase of 21.8% in quantity and 69.3% in value.

Mixed/blended silkgoods certified for exports during first quarter of the year 1997-98 amounted to 5.47 lakh sq. mtrs. valued at Rs. 742.79 lakh compared with 5.44 lakh sq. mtrs. valued at Rs. 549.76 lakh in the corresponding period of previous year and reflected an increase of 35.1% in value.

### Silkyarn

About a ton of spun silk yarn valued at Rs. 7.44 lakh has been certified for exports during the first quarter of 1997-98 as against 3 tons valued at Rs. 24.82 lakh in the corresponding period of 1996-97.

### Silkwaste

Silkwaste and its bye-products certified for exports during first quarter of the year 1997-98 amounted to 126 tons valued at Rs. 206.62 lakh as against 4 tons valued at Rs. 5.98 lakh in the corresponding period of previous year.

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# Silk Prices

## June 1997

### Raw Silk : Volume of Transaction

At all the silk exchanges in Karnataka, a total quantity of 127.853 tons of all qualities of raw silk valued at Rs.1258.266 lakh was transacted during the month of June '97 as against a quantity of 147.385 tons valued at Rs. 1548.337 lakh during June '96.

During the first quarter of the year of 1997-98 (i.e., April '97 to June '97) at all the silk exchanges

during June '96. Of the above transaction in Karnataka, the volume of transaction at Bangalore Silk Exchange alone accounted for 86.7% and 83.4% in both quantity and value, respectively.

During the first quarter of the year 1997-98 (i.e., April '97 to June '97) at Bangalore Silk Exchange, a total quantity of 397.942 tons of all qualities of raw silk valued at Rs. 3857.40 lakh was transacted.

The volume of trade at Bangalore Silk exchange during the period April '97 to June '97 accounted for 81.8% in quantity and 78.7% in value of the total transaction in all silk exchanges of the State.

Data on qualitywise transaction of raw silk at Bangalore Silk Exchange *vis-a-vis* at all the silk exchanges in Karnataka during June '97, June '96, April '97 to June '97 and April '96 to June '96 are given

**Table I. Transaction of Raw Silk at Bangalore Silk Exchange**

Raw Silk Quality	(Qty. : Tonnes, Value : Lakh Rs.)							
	June '97		June '96		April '97 - June '97		April '96 - June '96	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Filature/ Cottage Basin	20.978 (33.312)*	262.996 (421.589)	25.845 (44.597)	342.974 (575.722)	68.535 (122.308)*	863.473 (1541.790)	59.284 (103.154)	770.687 (1318.065)
Charka	67.687 (72.015)	661.548 (708.846)	63.597 (80.758)	659.122 (839.672)	251.874 (285.476)	2518.105 (2876.258)	176.467 (210.069)	1878.558 (2245.590)
Duplon	22.178 (22.526)	124.992 (127.831)	22.030 (22.030)	132.943 (132.943)	77.533 (78.678)	475.822 (485.564)	53.694 (53.798)	346.766 (347.465)
Total	110.843 (127.853)	1049.536 (1258.266)	111.472 (147.385)	1135.039 (1548.337)	397.942 (486.462)	3857.400 (4903.612)	289.445 (367.021)	2996.011 (3911.120)

+ Figures in brackets refer to total transaction at all the Silk Exchanges in Karnataka.

in Karnataka, a total quantity of 486.462 tons valued at Rs. 4903.612 lakh was transacted as against 367.021 tons valued at Rs. 3911.120 lakh of the preceeding year.

#### Bangalore Silk Exchange

At Bangalore Silk Exchange alone, which is the largest exchange in Karnataka, a total quantity of 110.843 tons of all qualities of raw silk *viz.*, filature/cottage basin, charka and dupion, valued at Rs. 1049.536 lakh was transacted during the month of June '97 as compared to 111.472 tons valued at Rs. 1135.039 lakh

**Table II. Transaction of Filature raw silk of different deniers at Bangalore Silk Exchange during June '97**

Denier	Quality	Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
				Min.	Max.	Avg.
13/15	Fine	216	280592	1280	1330	1299
14/16	Fine	1859	2356770	1160	1335	1268
16/18	Fine	4907	6102853	1100	1370	1244
18/20	Medium	5616	6949678	800	1350	1237
20/22	Medium	5417	7003744	400	1510	1293
22/24	Medium	666	779254	1100	1232	1170
24/26	Medium	491	570054	1060	1250	1161
26/28	Coarse	719	867554	1100	1400	1207
28/30	Coarse	316	397195	1090	1400	1257
30/32	Coarse	771	991906	1000	1450	1287
Total		20978	26299600	400	1510	1254



**Table III. Prices of Indigenous Silk**

(Rs./Kg)							
Silk Exchange	Variety	June '97			June '96		
		Min	Max	Avg	Min	Max	Avg
Bangalore Silk Exchange (Karnataka)	Filature/Cottage Basin	400	1510	1254	400	1560	1327
	Charka	570	1280	977	400	1450	1036
	Duplon	310	845	564	305	800	1097
Anna Silk Exchange, Kanchipuram Market (Tamil Nadu)	Filature/Cottage Basin	1025	1245	1156	1055	1325	1097
	Charka	750	935	880	800	1050	949

**Imported Silk (Varanasi Market)**

(Rs./Kg)				
Filature Silk 20/22 Dr	June '97		June '96	
	Min	Max	Min	Max
Chinese	1350	1500	1185	1300
Korean	1350	1575	1200	1300

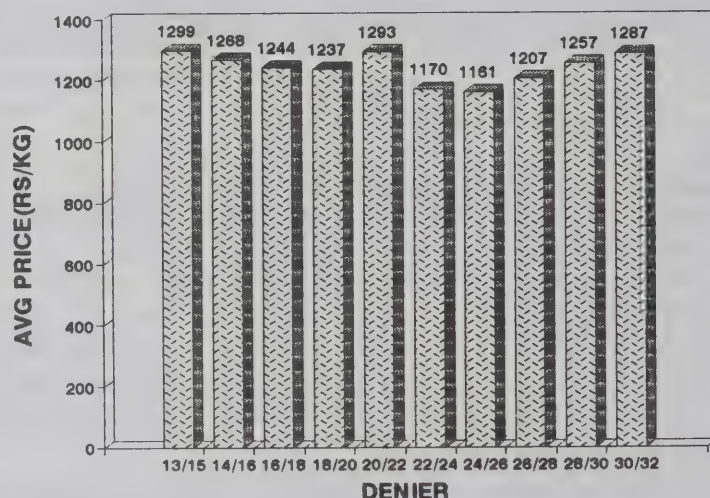
in Table - I and transaction of raw silk of different deniers of filature raw silk at Bangalore Silk Exchange during June '97 is given in Table-II.

### Prices of Sericultural Commodities

The prices of different qualities of indigenous raw silk that ruled at Bangalore Silk Exchange (Karnataka) and Anna Silk Exchange (Tamil Nadu) in addition to prices of imported raw silk at Varanasi market during the month of June '97 in comparison with June '96 are given in Table - III.

Also the prices of different varieties of mulberry reeling cocoons quoted at important cocoon markets of Southern states viz., Karnataka, Tamil Nadu and Andhra Pradesh are given in Table IV.

**Average Prices of Denierwise Filature Raw Silk Transacted at Bangalore Silk Exchange**



**Table IV. Mulberry Reeling Cocoon Prices**

(Rs./kg.)						
State	Market	Variety	June '97		June '96	
			Min	Max	Min	Max
Karnataka	Ramanagaram	Imp. cross breed	93	148	70	162
	T. Narasipur	Ord. cross breed	36	86	30	88
Tamil Nadu	Vaniyambadi	Imp. cross breed	51	129	60	126
	Coimbatore	Imp. cross breed	78	134	87	128
Andhra Pradesh	Hyderabad	Multivoltine	42	111	55	105
	Dharmavaram	Multivoltine	50	135	55	130

*Compiled by Statistical Section, CSB*





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Editor-in-Chief : **Arun Ramanathan, I.A.S.**

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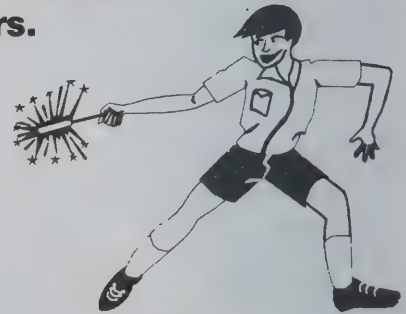
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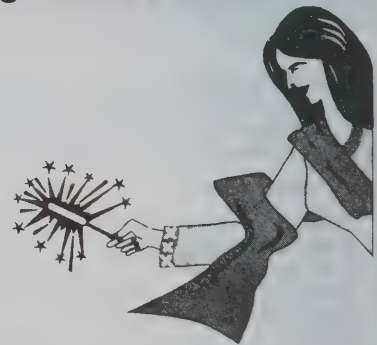
# Play it safe. It's Diwali!



- ☺ Light fireworks in open ground - never near or inside the house, terrace or balconies.
- ☺ Light fireworks from the side, never bend over them. Never light them in closed metal containers.
- ☺ Hold sparklers (*phuljhadis*) away from your body.
- ☺ Show concern for infants, the aged and the sick. Do not light loud crackers near them.



- ☹ Never store or unpack fireworks near an open flame or a heat source.
- ☹ Do not wear long, thin, flowing clothes while lighting fireworks.



- ☹ Never return to a firework once it is lighted — it may explode in your face.
- ☺ Pour water over burns till the pain subsides; go to a doctor. Do not apply ointment, butter, or any oily substance.

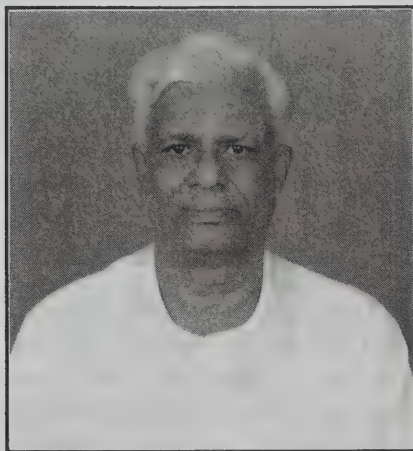


- ☹ Do not light candles and oil lamps near curtains, clotheslines, bookshelves, etc.





# Welcome, Mr. Chairman



**S**hri H. Ekanthaiah (62), an advocate by profession has assumed the charge as Chairman of the Central Silk Board - the apex body of sericulture and silk industry of the country, on 5th September, 1997.

Hailing from an agricultural family of Guilalu village in Hiriyur taluk of Chitradurga district of Karnataka, Shri Ekanthaiah, is a double graduate in Science and Law. He was a member of Karnataka legislature for two terms. His contribution to the state as a Cabinet Minister for Co-operation and Public Works Department is highly appreciated still. He had been the Chairman for Public Accounts Committee of the State Legislature and served in various capacities in several co-operative and educational institutions.

Today, the Indian silk industry is at cross-roads. Though, over the decades it has registered an impressive growth from

a mere poor man's avocation to a full time remunerative occupation, much is to be done to enhance the productivity and quality of our silk to match the international standards, to make sericulture more viable. The impressive horizontal growth registered over the years will no doubt serve as a spring-board to attain the much needed vertical growth.

The appointment of the new Chairman to the Board has evoked a sense of expectancy as regards the development of sericulture and silk industry during the post-NSP period especially when goals are being set out in the ninth five year plan, to further the development. With a well-organised infrastructure, research and extension net work, the arrival of the Chairman is a welcome sign, whose acumen and long experience certainly would prove instrumental to face the challenges ahead.

 **Editor**

### Additional doses : How much remunerative?

The article "Mulberry cultivation techniques under water stress condition" by Dr. K.V. Benchamin *et al.* (**Indian Silk**, July, 1997) is informative and also useful for extension workers. However, the recommendations on doses of fertilizers under various conditions need further elaboration.

The article recommends six doses under different spacings. However, the basis for reducing or increasing the NPK quantity is not clear as there is no correlation between doses of fertilizer, leaf yield and number of plants per hectare.

The fertilizer dosage and leaf yield under various spacings mentioned in the article are indicated in the Table.

In Purvanchal, it is observed that the yield of the recommended mulberry variety S 146 (under 90x90 cm spacing in irrigated conditions) goes upto 21 MT/ha/year in four harvests with the application of 100:50:50 kg of

Table. Fertilizer dosage and leaf yield under different spacings

Spacing (cm)	Number of plants per hectare	Dose of fertilizer recommended in article NPK/ha/year	Range of leaf yield Mt/ha/year
90 x 90	12345	100:50:50	8 - 10
180 x 180	3086	150:60:60	8
120 x 120	6944	200:50:100	24 - 29
90 x 90	12345	250:100:140	10 - 12
90 x 60	18518	280:120:120	22 - 39
60 x 60	27777	300:120:120	21 - 35

NPK/ha/year as recommended by the CSR & TI, Mysore whereas with the increase in NPK dose upto 200:100:70 (recommendation of RSRS, Dehradun), there is a gain of 2 MT (total 23 MT/ha). Further, with the application of NPK @ 300:120:120 as per another recommendation of CSR&TI, Mysore, the total yield of leaf would be 24.8 MT/ha i.e., an additional increase of 1.8 MT. Therefore, there is not much gain in leaf yield if the NPK dose is increased even beyond 100:50:50.

In 200:100:70 application, though the Nitrogen quantity has

been doubled, leaf yield increased only by 9.52%, whereas with three time increase in Nitrogen supply, the leaf yield increased by 18.09% only. Thus, the farmer can reduce the expenditure upto Rs. 2383/ha on fertilizers by resorting to the minimum dose of NPK @ in this region against the expenditure of Rs. 6225 for 300:120:120 at the present rate.

Dr. R. Kumar,  
Dr. R.K. Pandey,  
Dr. Gargi and  
S.B. Saraswat

Purvanchal Sericulture  
Development Project,  
Central Silk Board, Varanasi.

### Now, Land to Lab

This refers to the article 'Transfer of Technology' by Dr. S.B. Dandin (**Indian Silk**, July 1997). The article is comprehensive with valuable ideas.

The author rightly points out that, "what the scientists achieved in laboratories and in experimental plots seldom achieved when

put to practice or sometimes technologies partially accepted by the farmers".

The main reason is that the technology which is transferred to the land does not solve the prime problem of farmer or suit him. Also, a particular technology cannot be applied in toto throughout the sericulture zone. It has been

experienced that it needs micro/macro modification according to local requirements. Now, time has come to switch over to Land to Lab instead of Lab to Land.

Pradeep Shukla

Senior Research Assistant

Sericulture Training School  
SSPC, CSB,  
Deksara Kishanganj, Bihar.

## Readers Write

The **Letters to the Editor** column is an open forum where anyone who wants to say anything about sericulture and silk industry as well as articles/features published in **Indian Silk** is welcome to do so. Please make your letters brief and to the point. Send your letters to the Editor.



## Question & Answer

**B.T. Suresh,**

**Malnad Laboratories, Shimoga, Karnataka.**

**Q :** The leaf yield of 72 MT realized from a mulberry variety V1 with the recommended doses of fertilizer i.e., 300:120:120 NPK and 20 MT of farmyard manure is really noteworthy. But,, it is surprising to find that the water content of mulberry leaves is around 65-70% and dry weight 35-30%. Hence, the dry weight yield of leaves is  $72 \times .35 = 21.6$  to 25.2 MT. As the analysis of leaves showed the protein content to be around 18-20%, the protein yield would be  $21.6 \times 0.18$  or  $0.20 = 3.888$  or 4.32 MT on the lower side. The total nitrogen of the leaves is 627 to 696 kg, as per conversion factor 6.2. for protein to nitrogen. My doubt is:

1. How did the mulberry plant obtain the nitrogen of 620 to 696 kg from only an input of 360 kg/ha?
2. What is the efficiency of conversion of nitrogen of soil to leaf in mulberry?
3. Whether mulberry has any in-built mechanism of atmospheric nitrogen to be converted into leaf protein? If so, what is the percentage?
4. If all the excess nitrogen is from soil, when do you convert the soil into barren?

**A :** The main theme of the query is the nitrogen budgeting by the V1 mulberry variety which has a very high photosynthetic efficiency and found to be 60% more efficient in comparison to the variety S-36. Photosynthesis is directly related with increased yield of crop. Wade, 1973 indicated very clearly that if the rate of net photosynthesis could be increased, the yield also would improve. Moreover, photosynthesis essentially improves the incorporation of nitrogen and phosphorus.

The following details would clarify the nitrogen budgeting of V1 variety:

### **Output capacity per hectare per year**

- \* Leaf yield (fresh) : 70 T
- \* Leaf yield (dry) :  $70 \times 25/100 = 17.5$  T  
(75% moisture in leaf)
- \* Total nitrogen in leaf :  $17.5 \times 2.88/100 = 0.504$  T or 504 kg  
(N @ 2.88% in dry leaf)

### **Input per hectare per year**

Apart from the supply of nitrogen from manures and fertilizers, the quantity of nitrogen supplied spontaneously from air and soil also, is to be considered while calculating the inputs. This supply of nitrogen depends on the condition of different places. Without application of nitrogen from outside source, the leaf yield comes to 20,062 kg per hectare per year in mulberry (FAO Publication on Sericulture - Mulberry Cultivation).

Considering 35% dry matter and 2.4% nitrogen in dry leaf, the spontaneous supply of nitrogen comes to 168 kg per hectare per year, as:

- \* Nitrogen from fertilizer : 300 kg
- \* Nitrogen from FYM 20 MT @ 0.6%N : 120 kg
- \* Nitrogen from spontaneous supply : 168 kg

Total	: 588 kg
-------	----------

The input-output details clearly show that the nitrogen budgeting is quite perfect with the input of 300 kg nitrogen along with 20 MT of FYM.

Further, the application of 300 kg nitrogen is provided along with 20 MT of FYM yield 25 MT in local, 30-35 MT in Kanva-2 and 45-48 MT in S36. Obviously, genetical potentiality of improved varieties can change the yield level, significantly.

However, at the farmer's level, the Central Sericultural Research & Training Institute, Mysore has recommended a slightly higher dose of fertilizer after conducting trial at bigger plots and the recommended dose for V1 stands as N:P:K @ 350:140:140 kg/ha/year along with 20 MT of FYM.

**This new column offers expert views/suggestions to the day-to-day problems experienced by the readers in practising sericulture. Your questions should be specific, brief and relate preferably to the field-oriented problems.**

**– Editor**

# Isolation Chamber : A Tool for Chawki Silkworm Rearing

E. Muniraju, B.M. Shekarappa and R. Raghuraman

**Y**oung age silkworm (Chawki) rearing is of prime importance in silkworm rearing. Chawki worms (8-12 days) are to be raised under optimal environmental conditions such as temperature of 27-28°C, humidity of 80-85%, pathogen-free hygienic conditions and good quality leaves. The larvae, under optimum conditions, grow to the potential and can sustain adverse conditions better

**'Isolation Chamber' is an ideal tool for creating conducive conditions for the optimal growth and moulting of young age silkworms. The article reveals the significance of the technology through a field evaluation of the rearing undertaken by the adopted farmers of Kolar and Bangalore districts in Karnataka.**

during late age resulting in good cocoon crop. More than 90% of the sericulturists conduct rearings in their dwelling houses resulting in crops of varied performances and also inferior quality cocoons.

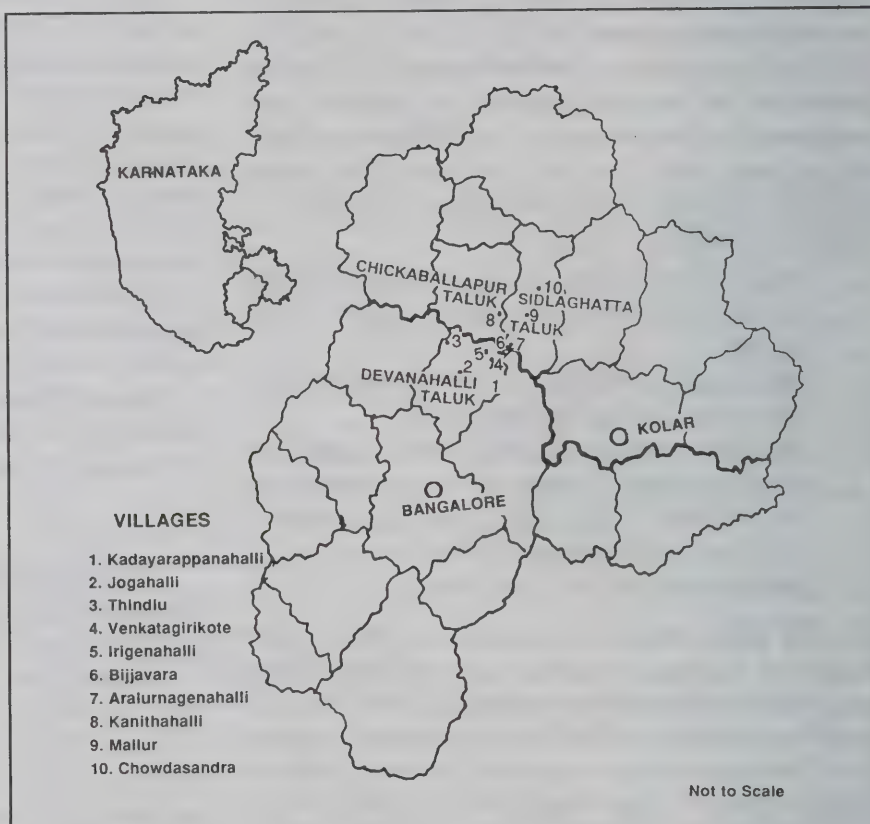


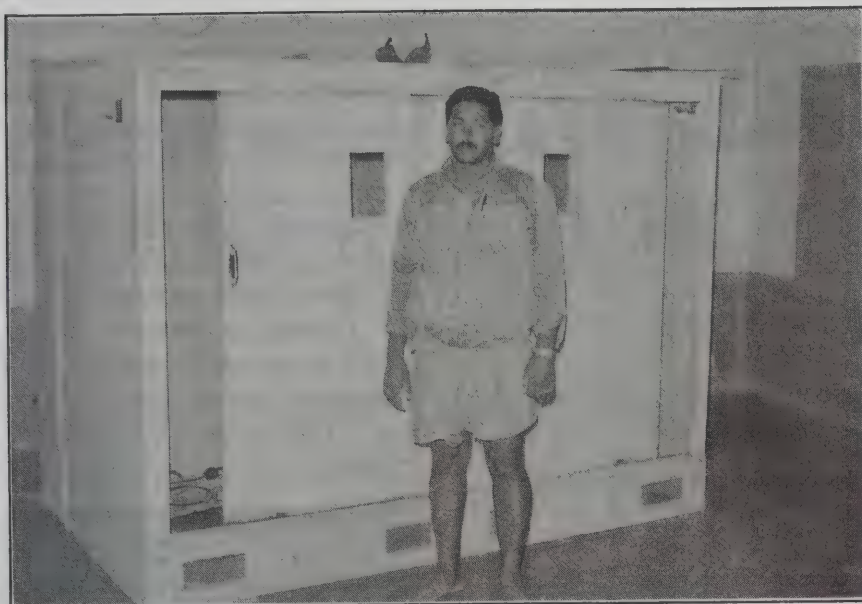
Fig. 1. Area of operation for use of isolation chamber at rearers level

## Technology available

Considering the prevailing situation in tropics, attempts were made to develop appropriate technologies that can meet the young age rearing requirements. Box type of rearing using paraffin paper and foam pads is one such attempt. However, the cocoon yield/100 layings remained far below the potential mainly due to incomplete adaption of recommended technologies. Keeping the prevailing situation in view, an *Isolation Chamber* (made of wood, 6'H x 4'W x 5'D with front

door of 5.5'H x 4'W, bottom and top ventilators with sliding doors, along with heating and humidification facilities) has been developed to meet the requirements of chawki rearing and can easily be adopted by the rearers. Application, usage and advantages of this 'Isolation chamber' has already been published in Indian Silk (30(5):21-24). Improvement in cocoon yield by 4-5 kg/100 layings and reduction in larval duration by two days have been recorded by using this chamber.





**Fig.2: An adopted farmer with Isolation Chamber**

### Field evaluation

Significance of this technology is well understood only when the same is evaluated under the prevailing field conditions. This would enable further studies to narrow down the gap in yield between laboratory and field. In the present study, 16 rearers from ten villages

of Kolar and Bangalore districts of Karnataka (Fig. 1) with a rearing capacity of 300-600 layings/crop were identified for evaluation of the 'Isolation chamber' for crop stability. Three rearings with three adopted rearers (Fig. 2-4) were conducted under the direct supervision of the scientists. Informa-

tion from 13 rearers who have adopted this technology continuously from last 1-3 years was collected.

### Rearing performance

Data presented in Table-1 reveal that over all larval duration is reduced by 12-18 hours by rearing the chawki in 'Isolation chamber'. Besides an increase in cocoon yield ranging from 7.8-13 kg/100 layings resulting in increased income/chamber varying from Rs. 2823-4662/crop has been recorded. The stability of crop is assured by adopting this method.

### Field survey

Opinion of the rearers confirmed the reduction in larval duration upto 48 hours during chawki with an overall reduction of 72 hours and an increase in the cocoon yield by 12.5 kg/100 layings (Table-2). Growth pattern and moulting have been observed to be more uniform in respect of larvae reared inside the chamber. Keeping quality of leaf in the rearing bed inside the chamber was better and, therefore, improved efficiency in leaf utilization leading to better growth. Most of the rearers have experienced better crop stability when the chawki rearing was conducted inside the chamber.

The present report on the evaluation clearly indicates that isolation chamber provides more or less the required environment for the growth and development of the young age silk worms. Taking advantage of the small volume inside the chamber as compared to the dwelling house required temperature (28°C) can be maintained using thermostatically controlled heat convactor. Wherever, the heat convectors cannot be used for want of continuous or non-availability of

**Table 1 : Use of Isolation Chamber for young age silkworm rearing (Average of 3 crops)**

Sample No.	Treatment	Lar. duration		Cocoon yield/ 100 dfls (Kg)	Increased cocoon yield/ chamber (300 dfls)	Extra income Chamber (@Rs. 120/kg)
		young age	Total (days)			
1	Inside	10.14	25.00	64.76	23.53	2823.70
	Outside	12.12	27.08	56.91		
2	Inside	10.20	24.12	74.06	38.85	4662.00
	Outside	11.20	25.04	64.38		
3	Inside	10.42	24.42	63.50	38.10	4568.40
	Outside	11.08	26.58	50.80		
Mean	Inside	10.50	24.50	47.44	30.24	3628.80
	Outside	12.00	26.50	57.36		
	Diffe.	1.50	2.00	10.06		
	F Test	HS	HS	HS		
	CD at 5%	0.507	1.2433	8.1883		
	CD at 1%	0.699	1.7131	10.0037		

Note : HS = Significant at 1%, S = Significant at 5%, NS = Non Significant

**Table-2: Rearers view on adopting Isolation Chamber**

Parameters considered	Stage of evaluation		Young age	Late age (Total)		F Test	CD@ 5%	CD@ 1%
Larval duration	Before		D : H 13:18	D : H 27:12	Yo. age	HS	0.56	0.772
	After		11:12	24:18	La. age	HS	0.62	0.841
Moulting Behaviour (%)	Before	Uniform	0.00	61.54				
		Not Uniform	100.00	23.08				
		No difference	0.00	15.38				
	After	Uniform	100.00	84.62				
		Not uniform	0.00	00.00				
		No difference	0.00	15.38				
Leaf Requirement (%)	Before	Less	46.15	0.00				
		More	38.46	15.39				
		Same	15.38	69.23				
		No idea	0.00	15.39				
	After	Less	38.46	15.39				
		More	46.15	0.00				
		Same	15.38	69.23				
		No idea	0.00	15.39				
Leaf quality on the bed (%)	Before	Withering was fast	100.00	--				
	After	Withering was slow	100.00	--				
Crop Consistency (%)	Before	Good		0.00				
		Not good		92.31				
		No difference		7.69				
	After	Good		92.31				
		Not good		0.00				
		No difference		7.69				
Cocoon Yield/100 DFLs (kg)	Before			46.27		HS	5.46	7.4
	After			58.85				

Note : HS = Significant at 1%, S = Significant at 5%, NS = Non Significant

power, the temperature maintained in the chamber is far more uniform and stable than outside. The humidity can be easily maintained as per the requirement irrespective of the availability of electricity. The rearing performance is not drastically affected even with frequent power failures as confirmed by the present study.

Humidity recorded in the chamber is always higher (8 -10%) even without the use of heat convectors. Humidity is raised by

spreading a wet gunny cloth or providing water in a tray on the floor of the chamber. Humidity of 80-85% can be easily achieved by adopting this method.

It is observed that the rate of moisture loss from the leaves used for chawki is less in the chamber because of increased humidity, which in turn, enhances the leaf utilisation by the larvae resulting in better growth of leaves.

The 'Isolation chamber' fabrication using wood is estimated to cost Rs. 6000, which can be easily

reduced by 25-30% by constructing brick wall on one side in a corner of the rearing room and using vinyl sheets. Rearing inside the chamber results in extra cocoon production of 25 to 38 kg of cocoons for 300 dfls reared, fetching an additional income of Rs. 3000-4560 at the rate of Rs. 120/kg of cocoons. Therefore, the rearers will recover their investment within the first year itself. The estimated life of such chambers being over ten years,



**Fig. 3. Arrangement of rearing trays inside the Isolation Chamber**

the net realisation by adopting this approach would be highly remunerative.

Isolation Chamber is well suited for the dwelling-cum-rearing house of the rearers in tropics and can be maintained at low operational cost. It markedly reduces the both-eration of chawki rearing, improves cocoon yield and crop stability. It will also be a tool for providing near optimum rearing conditions for robust growth of young age larvae and associated crop performance.

**The authors are with Karnataka State Sericulture Research and Development Institute, Thalaghattapura, Bangalore.**



# Cultural Methods to Control Root-knot in Mulberry

Tomy Philip

**A**mong the various diseases that affect mulberry, root-knot is one of the most damaging and difficult-to-manage. Mulberry being a perennial crop, uprooting is not feasible like other annual agricultural crops. This creates a suitable soil condition for repeated multiplication of the nematode.

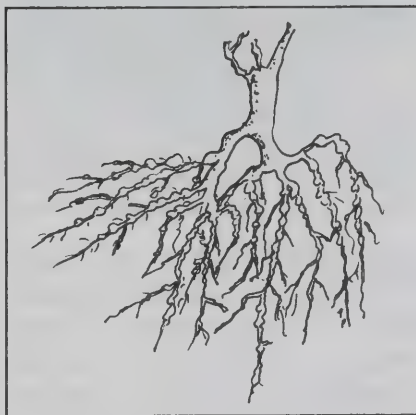
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***Root-knot is the most common disease found in mulberry, thereby affecting the productivity. Though the disease can be controlled by chemical and other methods, cultural practices are more economical, practicable and non-hazardous. The article deals with the various cultural methods that can stem the disease.***

---

## **Incidence**

Root-knot disease has been reported from almost all mulberry cultivating areas in India. However, its incidence is more in sandy soils with irrigation facility. The damage is to the extent of



**Fig. 1. Root-knots**

12-15% in leaf yield per year. The incidence was found to be heavy in Mandya and Kolar districts of Karnataka and Anantapur and Hindupur in Andhra Pradesh. Incidence is comparatively less in Tamil Nadu and almost nil in Kerala.

## **Various control methods**

The objective of nematode control in mulberry is to improve plant growth and yield. This can be achieved through a reduction of the nematode population in soil or in plants. However, any control measure should be cost-effective.

Reduction of nematode population in the soil can be achieved by various methods such as cultural, chemical, biological and also through an integrated approach. The direct control of nematodes by chemicals or physical means is not often economical or practicable, especially in fragmented fields. Besides being costly, chemicals may create environmental hazards and

residue problems and destroy useful microbes in the soil. Nematodes may also develop resistance against chemicals, if used repeatedly.

Biological methods for root-knot control are not yet available as they are still in the preliminary stages of development, and the available methods do not guarantee a result better than that obtained through chemical or cultural methods.

## **Cultural methods**

Cultural methods are cheap, effective, have minimum effect on non-target organisms, no toxicity or residue problems and can be practised even without special skills. Cultural methods always aim towards fields sanitation in order to prevent the introduction of inoculum into field and to reduce or eliminate inoculum from diseased field.

The efficiency of most cultural practices in reducing nematode population varies with soil types, climate and nematode species or races involved. For instance, summer fallowing and deep ploughing may be more efficient in dry and hot semi-arid zones but, not in temperate region or wet climate.

Some of the most effective cultural methods that can be practised in mulberry field for suppressing nematode population in the soil are:

**Healthy saplings :** Nematodes often pass from one field to

another through saplings and farm implements. Selection of healthy saplings free from nematode infection is highly essential to prevent the spread of this disease from infected to healthy plot. Hence, quarantine measures have to be followed strictly.

**Summer ploughing :** Two or three deep ploughings with a soil turner in summer months expose the nematodes and infected tissues in soil to solar heat and dehydration. This will also help suppress other pathogenic soil fungi such as *Fusarium* which cause root-rot disease, bacteria and weeds. The efficiency can be improved if the soil is covered with polythene sheet to trap and retain more temperature than the exposed soil. Exposure of moderately moist soil to solar heat will be more beneficial, since the active nematodes are more vulnerable to moist heat.

**Weeding :** Weeds are a perennial source of infection of nematodes. The diverse weed flora present in mulberry garden almost throughout the year usually nullify the effect of other control methods. Thorough weed control with weedicides or mechanical means is essential along with any nematode control methods.

**Intercropping :** Intercropping of nematicidal or trap crops is reported very effective in reducing the nematode problem in many crops. Plants like sesamum, marigold, sunhemp etc. are excellent intercrops in mulberry field infested with the nematode. Sunhemp is reported exerting a toxic effect on *Meloidogyne* larvae. Barrons (1940) demonstrated that *Meloidogyne* larvae freely enter the roots of sunhemp, but failed to develop into adults and thus were killed. Species of *Tagetes* (marigold) contain the

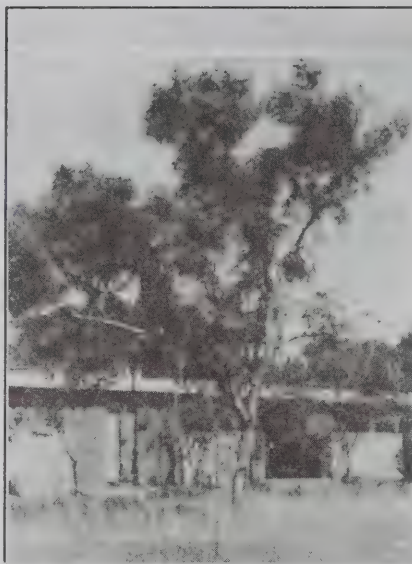


Fig. 2. Neem : A nematicidal plant

chemical  $\alpha$ -terthieny which is toxic to nematodes. Similarly, root exudates from sesamum have nematicidal properties against *Meloidogyne incognita*. Experiments conducted at Central Sericultural Research and Training Institute, Mysore have also proved the utility of sesamum and marigold as effective intercrops to reduce nematode damage in mulberry.

Though sunhemp intercropping was also found effective to reduce nematode population in the soil, its fast growing nature often overshadows the growth of mulberry and thus, reduces the mulberry leaf yield. Sesamum and marigold being small plants, do not pose such problems for mulberry. They also produce seeds/flowers which in turn, bring extra income to the farmer. All these plants can also be used as green manure after their full growth.

In addition, there are many plants which contain nematicidal properties, in their leaves viz., Neem, Pongamia, Papaya, Kalli and Ekku. Mulching of leaves of these plants in mulberry fields infested with root-knot disease will not only reduce the nematode

population in the soil but also enrich the soil.

**Organic manuring :** A lot of research has been carried out on the effect of organic amendments/manuring on nematode population. The oil seed cakes have been the most popularly experimented material. Certain non-edible oil seed cakes such as neem (*Azadirachta indica*), Karanj (*Pongamia glabra*), castor (*Ricinus communis*) etc., have shown special potential in controlling root-knot disease. They contain considerable amount of phenolic compounds which are toxic to nematodes. In mulberry, the application of neem-cake has been reported very effective to control the disease. These oil cakes besides suppressing the nematode population, enrich soil fertility. Farm yard manure and cattle urine are also reported to reduce the nematode population in soil. Hence, encouraging the use of FYM will not only have some check on nematodes, but also reduce the dependence on fertilizers.

**Flooding :** In areas where water is not a limiting factor, flooding of mulberry fields can be practised as a measure to reduce nematode problem. Keeping the land submerged in water decreases oxygen content of the soil and kills the nematode. Chemical lethal to nematodes such as Butyric acid and Propionic acid, Hydrogen sulphide and Ammonia often develop in flooded soil.

Proper and timely use of relevant cultural practices can definitely keep the nematodes below the damaging level and avoid leaf loss, without altering the ecosystem.

**The author is working with Research Extension Centre, CSB, Angamaly, Kerala.**



# Chinese Oak Tasar Farm Technology and its Relevance to Indian Conditions

S.K. Mathur and S.R. Vishwakarma

**C**hina is the largest oak tasar silk producing country contributing about 90% of the global production. The technologies developed in China for the management of oak tasar farms have played a significant role in qualitative and quantitative improvement in the production of

***China, being the largest producer of Oak tasar silk in the world, has developed several technologies of food plant management to improve its production and productivity, as well. These technologies could be of relevance to the Indian Oak tasar culture concentrated mainly in the sub-Himalayan belt with similar agro-climatic conditions, opine the authors.***

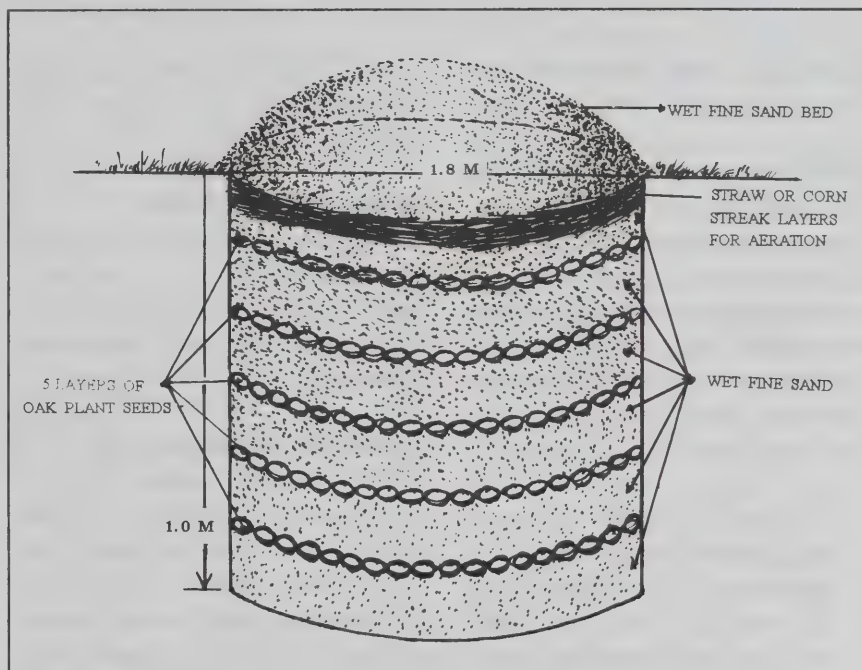


Fig. 1. Storing of oak plant seeds

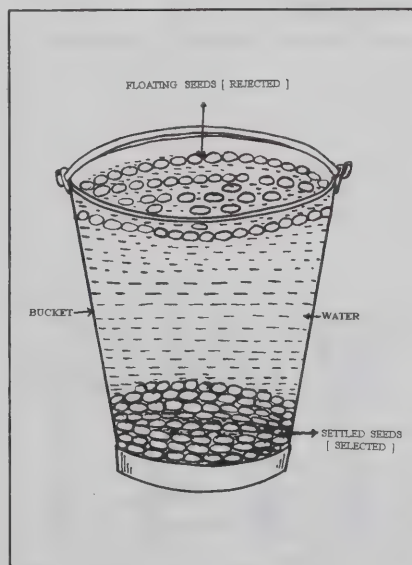


Fig. 2. Selection of oak plant seeds for germination

oak tasar cocoons. A brief description of technologies developed in China and its relevance to India is discussed below :

## Transformation of natural forest

Most of the natural oak plantation is found in a mixed flora in the forest. Hence, it is necessary to remove the unwanted trees, prune out tall oak trees into medium size bushes and clean all the shrubs to transform the plot into a tasar farm and carry out tasar culture. The transformation depends on various factors viz., soil type, soil texture, climate,

**Table 1. Effect of different species of *Quercus* on growth and development of Tasar Silkworm *A. Pernyi*. (Liaoning Province)**

Species	No. of silk worms	II Instar Larvae		III Instar Larvae		IV Instar Larvae		V Instar Larvae		Mature Larvae	
		Weight of 100 larvae(g)	Index No.	Weight of 100 larvae(g)	Index No.	Weight of 100 larvae(g)	Index No.	Weight of 100 larvae(g)	Index No.	Weight of 100 larvae(g)	Index No.
<i>Q. oxylobe</i> F.	662	5.44	100.0	27.7	100.0	117.5	100.0	478.5	100.0	1115.0	100.0
<i>Q. dentata</i> Max.	663	6.02	110.7	35.4	127.8	140.2	119.3	543.6	113.6	1358.2	121.8
<i>Q. mongolica</i> Fi.	668	5.16	94.9	34.7	125.3	136.4	116.1	601.9	125.8	1303.3	116.9
<i>Q. acutissima</i> Carr.	938	5.68	104.4	31.9	115.2	149.2	127.0	612.3	128.0	1456.6	130.6
<i>Q. liautungensis</i> K.	795	6.01	11.5	38.1	137.5	162.7	138.5	613.2	124.8	1478.1	132.6

topography and socio-economic conditions of the local people.

### Setting up a new tasar farm

There are over 80 oak plant (*Quercus*) varieties in China. Considering chemical constituents and good performance during silkworm rearing with regard to growth and development, the following five species of *Quercus* are commonly used for silkworm rearing.

- Quercus oxylobe* F.
- Quercus dentata* Max.
- Quercus liautungensis* Koial.
- Quercus acutissime* Carr.
- Quercus mongolica* Fisch.

The effect of above species on

growth and development of tasar silkworm larvae is given in Table 1.

### Plantation methods

There are two methods of raising oak plantation viz., (i) Direct seed sowing and (ii) Seedling raising in nursery and then transplantation.

#### (i) Direct seed sowing

a. *Storing of seeds*:: The oak plant seeds are generally collected in autumn and are required to be stored from Autumn to Spring (December to April) before sowing in May. The Chinese technology advocates storage of seeds underground in a pit of 1.8 M.

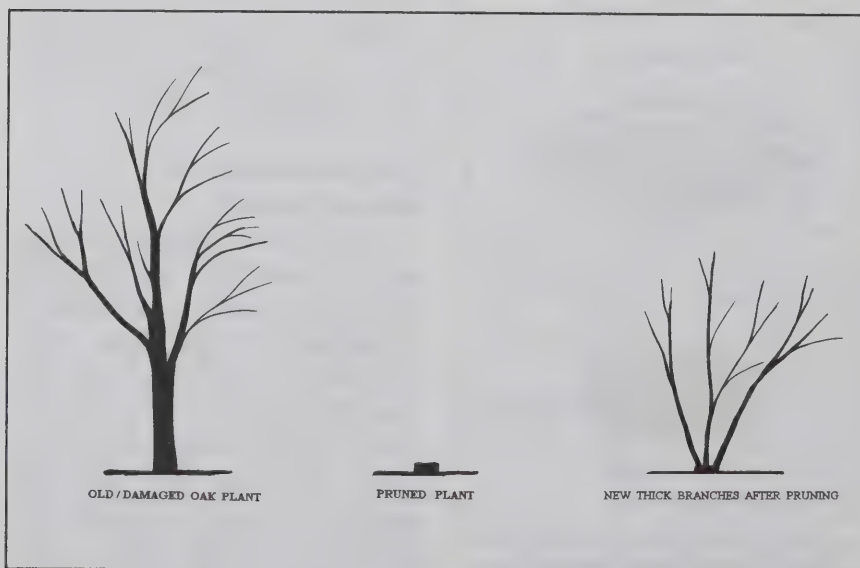
diameter and a depth of 1.0 M. In this pit, five layers of oak seeds are spread with alternate wet fine sand beds. A fine sand bed layer and straw or corn streaks are spread on the top of the pit for covering as well as facilitating aeration. Finally, the pit is covered with wet fine sand (Fig. 1).

b. *Selection of seed*: Seeds are generally selected by floating method i.e., the seeds are poured in a bucket of water. Heavier seeds settle down at the bottom whereas lighter seeds float in water. Heavier seeds are selected for germination (Fig. 2).

c. *Chemical treatment to kill weevils*: Following methods are adopted for selected oak plant seeds to kill weevils.

- Seeds are treated with 25% rogor in the ratio of 1:700 for 48 hrs.
- Fumigation : Seeds are treated with Aluminium phosphide @ 7.5 g per cubic M. area at 23°C. They may also be treated with liquid Carbandi-sulphide @ 20-30 ml./cubic M. at 23°C for 20 hrs.
- Soaking with lukewarm water at 60°C for 10 minutes or 50°C for 25 minutes.

d. *Running water treatment*: Washing of oak plant seeds in running water may also help the seeds germinate upto 90%.



**Fig. 3. Trunkless pruning**



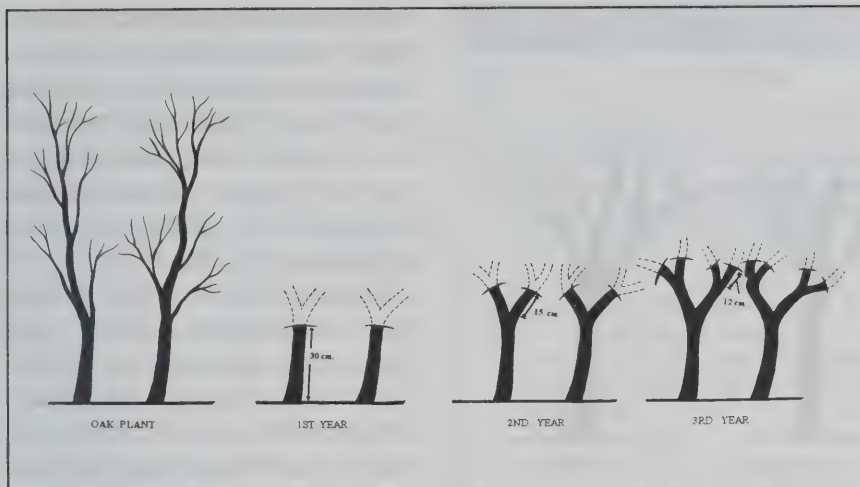


Fig. 4. Low trunk pruning

The treated seeds thus selected are directly sown in the field. The seeding pit is 30 cm. deep in which about 10 seeds are put together. The seeds are covered with 5-8 cm soil. The spacing between row to row is kept at 2 M. and plant to plant at 1.5 to 2.0 M.

## (ii) Seedling raising in nursery and transplantation

In order to make germination quick and uniform, seeds are soaked for 10 to 15 days before seeding. Some old soil with fungus - microrhizas, is mixed together with the seeds in order to absorb nutrients from the soil and fix nitrogen for better growth and

vigour of the plant. In nursery, the spacing between row to row is kept at 12-14 cm. and 10 cm between plant to plant. The seeds are sown at a depth 4-6 cm. About 50 seedlings are raised per square meter area and after about 2 years, the seedlings are transplanted in the field. The pit system is followed for transplantation of seedlings. Each pit contains 3-4 seedlings. The spacing in plantation is predetermined whether the farm would be used for young or late age silkworm rearing. If it is for young age rearing, the spacing would be maintained at 1.5 x 1.5 M. whereas for late age rearing, it would be 2.0 x 2.0 M.

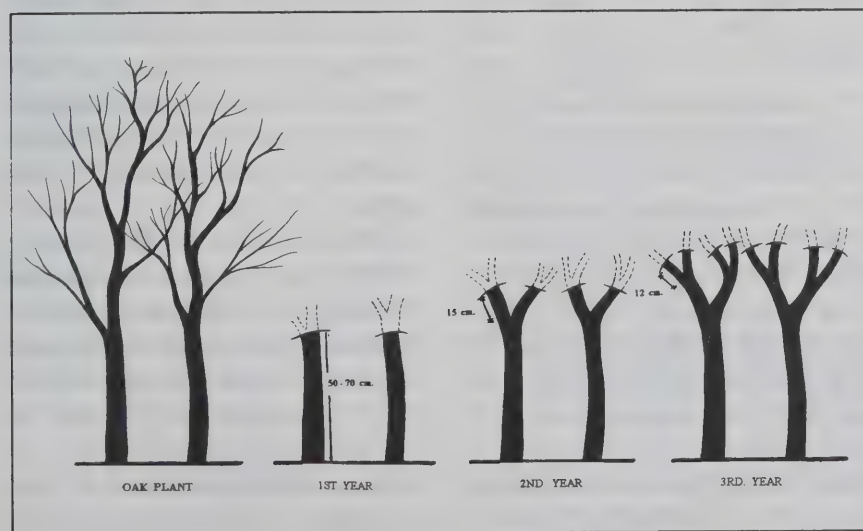


Fig. 5. Middle trunk pruning

## Reorganisation of existing plantation

Most of the tasar farms in China lie on slopes. The inclination of slope and the scour of rain easily result in erosion of top soil leading to poor quality of soil and affect adversely the growth of plants. Therefore, water and soil conservation and fertilizer management are enhanced to increase the soil productivity and to gain stable leaf harvest. The measures of water and soil conservation must suit local conditions, viz., building of level ditches/dams/anikets, building of terrace, fish scale pits etc. Timely intercultural operations are carried out to increase the utilisation ratio of tasar farm. The hilly forest area is rich in green manure. Therefore, the abundantly available wild tender plants and branches are used as green manure to supplement the nutrients and improve texture of the soil in the farm. However, application of granulated fertilizer (Urea @ 0.1 kg./bush/3 years) to the roots of the plants (20-30 cm. deep) is better.

## Techniques for pruning

Alternate pruning and pollarding is carried out to keep the fixed height and shape of oak plants which benefit outdoor rearing. Rejuvenation measures are taken to make branch and leaf exuberant, resulting in increase of leaf quality and quantity. Following methods of pruning are practised in China.

**Trunkless pruning:** Old trees that are no longer suitable for silkworm rearing are cut from their bases during dormancy to allow them to sprout. Afterwards, alternate pruning is carried out every 1-3 years. This kind of plantation is suitable for young silkworm rearing due to

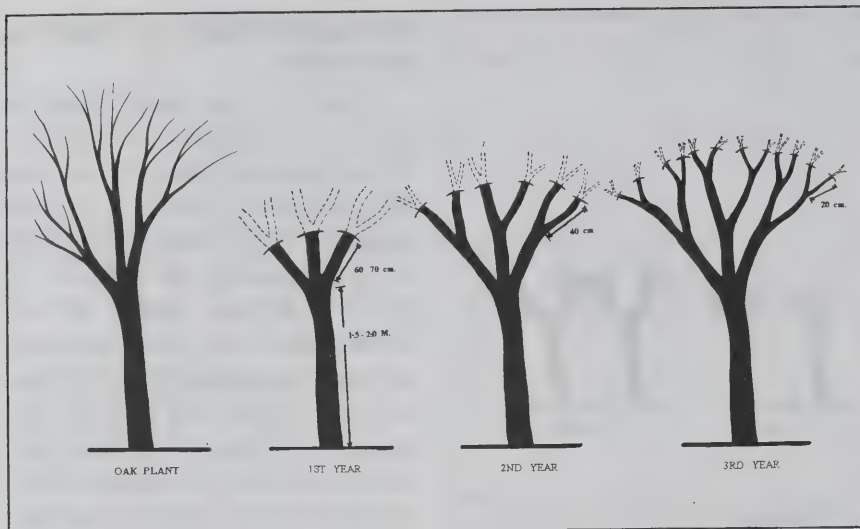


Fig. 6. High trunk pruning and branching pattern

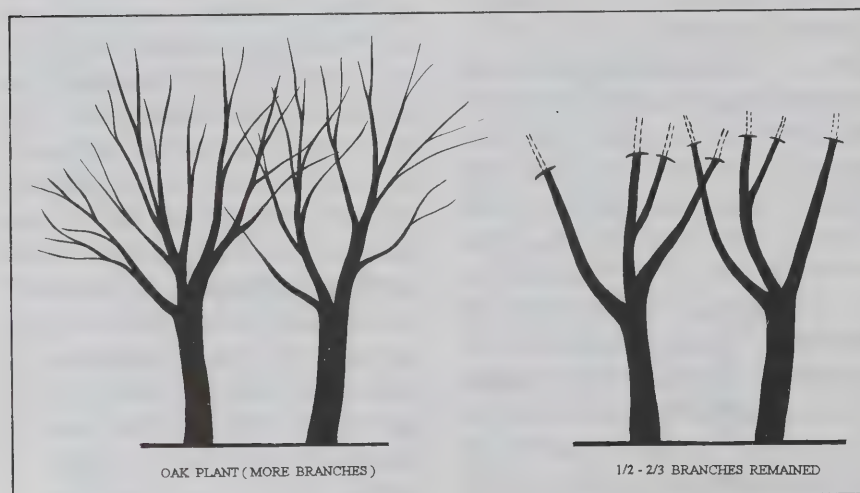


Fig. 7. Regulation of leaf quality by thinning of old shoots

convenient height and less damage by gush of wind. However, its small bush crown leads to easy contamination of leaf by soil and large thermal radiation from earth. Hence, the utilization ratio of such plantation is reduced (Fig. 3).

**Low trunk pruning :** In this method, during first year, the main trunk is pruned at a height of 30 cm. above the ground level during dormancy period. During second year, 2-3 thick healthy branches are selected and rest removed. These branches are also pruned at a length of 15 cm. from their bases. Similarly, during third year, 2-3 healthy secondary branches arising from the selected

primary branches are left and rest removed. These secondary branches are also pruned at a length of 12 cm. from their bases. After forming tree crown, it is called low trunk oak tree (Fig. 4).

**Medium trunk pruning :** In this method, during first year, the main trunk is pruned at a height of 50-70 cm. above the ground level during dormancy period. During second year, while pruning attention is paid to reserve 1-2 side branches spreading out from the trunk and cut upper part of these side branches at 15 cm. apart from their bases. During third year, 2-3 secondary branches arising from the selected primary

branches are left and rest removed. These secondary branches are also pruned at a length of 12 cm. from their bases. These side branches are replaced with new ones in every 2-4 years. The branches are kept parallel to the ground as far as possible (Fig. 5).

**High trunk pruning :** For late age tasar silkworm rearing, high trunk oak plants are maintained. Generally, a plot of oak plants with main trunks of 1.5-2.0 M. height from the ground level are selected. During first year, 2-3 healthy thick branches are selected and rest removed. These primary branches are pruned at a length of 60-70 cm. from their bases. During second year, 2-3 healthy secondary branches arising from the primary branches are selected and rest removed. These secondary branches are pruned at a length of 40 cm. from their bases. During third year, 2-3 healthy tertiary branches arising from secondary branches are also pruned at a length of 20 cm. from their bases and rest removed (Fig. 6).

Medium trunk pruned oak plants are better as compared to low and high trunk pruned plants with respect to leaf yield and high utilisation ratio, strong resistance to drought and flood, ventilation and convenient operation etc. Although, the tree crown of high trunk pruned oak is big, operation is not convenient. They are most suitable for tasar cultivation near ponds.

**Rejuvenation of old trees :** The old trees used for many years or damaged by longicorn beetles become weak resulting in poor leaf yield. At this time, the rejuvenation is carried out. For this, all the trunks and branches are cut down at the joining place of root and trunk. The thick branches given out from the root after spring



are used for silkworm rearing.

**Regulation of leaf quality by thinning old shoots :** In order to improve leaf quality, diseased and hanging down branches are cut in winter or early spring. The total thinning is done to about 30%. After thinning, the average length of branches increases by 52.63% and leaf quantity by 19%. This type of thinning increases the moisture, protein and soluble sugar contents in the leaves. Silkworms reared on these plants give higher ERR and cocoons with high SR %. This method is suitable for farms having rich soil texture (Fig. 7).

### Relevance to Indian conditions

The topography, climatic conditions and oak tasar food plants in sub-Himalayan belt of India are similar to that of China. The Chinese oak tasar food plant *Q. acutissima* resembles *Q. serrata* commonly available in North-eastern region of India and used extensively for oak tasar silkworm rearing. India is also trying to boost its oak tasar production, but desirable success at commercial level is yet to be achieved. The research stations located in temperate tasar zone have developed many technologies for the improvement of oak tasar culture, however, specific technology for the management of oak tasar food plants is still wanting. The afore-said Chinese technology for the management of oak tasar farms may be adopted with need-based modifications and to suit socio-economic conditions of the local people. This may help in improving oak tasar production and quality of cocoons in India.

**The authors are with Central Tasar Research and Training Institute, Ranchi.**

Seri Videos		
Sl. No.	Name of the Video	Languages Available
1.	<b>Sericulture in India</b> The film explains the significance of sericulture as an agro-based industry and its role in the rural development and depicts the R&D efforts of CSB	English, Hindi, Assamese, Bengali, Gujarathi, Kannada, Kashmiri, Malayalam, Marathi, Telugu, Oriya, Punjabi, Tamil, Chinese, French, Japanese, Portuguese, Russian, Spanish
2.	<b>Package for Prosperity</b> An exposure to recommended technologies in mulberry cultivation, silkworm rearing and the results of R&D efforts.	English, Hindi, Assamese, Bengali, Gujarathi, Kannada, Telugu, Malayalam, Marathi, Oriya, Punjabi, Tamil
3.	<b>A Stitch in Time</b> It deals with various diseases of silkworm indicating their specific symptoms and recommends preventive measures.	English, Hindi, Malayalam, Bengali, Tamil, Kannada, Telugu
4.	<b>Bivoltine for Higher Yield: More Income</b> Describes the economic viability of bivoltine sericulture and also deals with incidence and control of silkworm diseases.	English, Hindi, Assamese, Bengali, Gujarathi, Kannada, Telugu, Malayalam, Marathi, Oriya, Punjabi, Tamil, Kashmiri, Urdu
5.	<b>Strong Ties, Loose Threads: Women in Silk</b> The film recognises the role of women in different aspects of sericulture, from mulberry cultivation to silk weaving.	English, Hindi, Bengali, Kannada, Telugu, Tamil, Kashmiri
6.	<b>Story of Tasar</b> A documentary on rearing of tasar silkworm by the tribals.	English
7.	<b>Golden Muga Silk: The Cultural Heritage of Assam</b> Awarded as the best industrial film in 1988, it narrates the production of golden muga silk in North-east regions of the country.	English
8.	<b>Eri Silk in the North East</b> This film narrates various activities of Eri Culture practised in North-eastern India.	English
9.	<b>Life Story of a Moth-The Silkworm</b> An educative film on the domesticated mulberry silkworm <i>Bombyx mori</i> L	English, Hindi
10.	<b>Sericulture Deserves Credit</b> This film aims at acquainting the bankers of the economic viability of sericulture.	English
11.	<b>Reeling for Quality Silk</b> The film deals with the technique of reeling which has a direct bearing on the quality of silk.	English, Bengali, Gujarathi, Hindi, Kannada, Kashmiri, Oriya, Tamil, Telugu, Punjabi, Marathi, Malayalam, Assamese, Urdu
12.	<b>Prevention is Better than Cure</b> This film details the health hazards in reeling and grainage activities and also precautionary measures to be adopted.	English, Kannada, Telugu, Bengali and Tamil
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# Sericigenous Fauna and Flora of Himachal Pradesh

Raja Ram

**H**imachal Pradesh is spread over an area of 55,673 km<sup>2</sup> covering 1.69% geographical area of the country. It is situated between 30°22'40" and 33°12'40" N latitude and 75°41'55" and 79°04'20" E longitude. The state is divided into four agro-climatic zones, viz.,

**Himachal Pradesh, endowed with subtropical and temperate climate conditions, has a grainery of rich sericigenous fauna and flora offering good prospect especially for muga culture hitherto confined to the North-eastern region. The article gives an insight into this forest wealth besides stressing the need to preserve them for posterity.**

- a. Shivalik hills up to 800 m,
- b. Mid hills 800 to 1600 m,
- c. Dry hills 1600 to 2700 m and
- d. Cold dry hills above 2700 m altitudes.

The climate varies according to the elevation. It is subtropical in lower part, temperate in middle portion and aridic in the high



Fig. 1. Sericigenous insects - [1] *Antheraea assama*, [2] *A. siwalika*, [3] *A. proyle* and [4] *Philosamia cynthia*

mountains covered perpetually with snow. Subtropical and temperate climatic conditions are found suitable to a wide range of fauna and flora of sericigenous insects.

## Wild sericigenous fauna

During the course of investigation, different species of *Antheraea* and other sericigenous larva/cocoons were collected, identified and their characters studied.

*Antheraea assama* (Muga) : *A. Assama*, a sericigenous insect of muga silk is endemic to North-eastern region, in particular to Assam, where the food plant and its unique climatic conditions restricts the distribution of the species. Autumn (Oct.-Nov) is the main commercial crop cultivated between 16 and 20° temperature

followed by spring (May-June) by 20 to 25°C and the others are seed crops. Studies by Arora and Gupta (1979) have revealed that *A. assama* is not only distributed in the states of Himachal Pradesh, Uttar Pradesh, Sikkim, Assam, Meghalaya, Gujarat and Pondicherry of our country but also found in countries like Bangladesh, Sri Lanka and Indonesia.

During the last week of May, 1995, four muga silkworms in fifth instar and seven cocoons were collected on the *Litsaea polyantha* plant from Mission Compound area of Palampur. Besides, Gadoral village in Kangra district which is about 6-7 km from Palampur, where food plants are available in plenty and people use the leaves as fodder, was found to be a

**Table 1. Sericigenous insects in Himachal Pradesh**

Name of insects	Place of collection/rearing		Period of collection/ Rearing (Month)	Main food plant	Coccon characteristic		
	Place	Distt.			Cocoon Weight (gm)	Shell Weight (gm)	S.R. (%)
<b>A. Wild Moth</b>							
<i>Antheraea Assama</i>	Palampur	Kangra	May-June	<i>Litsaea monopetala</i>	7.50	0.68	9.07
<i>A. Siwalika</i>	Kangra valley	Kangra	Aug.-Sept.	<i>Ziziphus mauritiana</i> and <i>Terminalia arjuna</i> .	9.27	1.52	16.40
<i>A. royle</i>	Billing Winch Camp	Kangra Mandi	May-June	<i>Q.semecarpifolia</i>	9.99	1.28	12.81
<i>Philosomia Cynthia</i>	Palampur	Kangra	May-June	<i>Pyrus pashia</i>	2.32	0.39	16.81
<b>B. Cultivated Moth</b>							
<i>A. proyle</i>	Throughout Kangra and Mandi Districts		Mar.-Aug.	<i>Q. incana</i> and <i>Q. semecarpifolia</i>	6.60	0.67	10.15
<i>A. pernyi</i>	- do -		- do -	- do -	6.65	0.67	10.07
<i>Bombyx Mori</i>	Throughout Himachal Pradesh except Lahul spiti & Kinnor		Throughout year	<i>Morus</i> species	1.79	0.35	19.55

suitable place for the development of muga silkworm.

The larvae were reared for 3-4 days on the same food plant for completion of the larval period. The cocoons were about 4 to 5 cm in length with golden yellow in colour (Fig. 1). The cocoons (11 numbers) were analysed and cocoon weight, shell weight were recorded and SR per centage was

calculated (Table 1). The area where the insect is surviving is situated at 4600' altitude and climate is temperate.

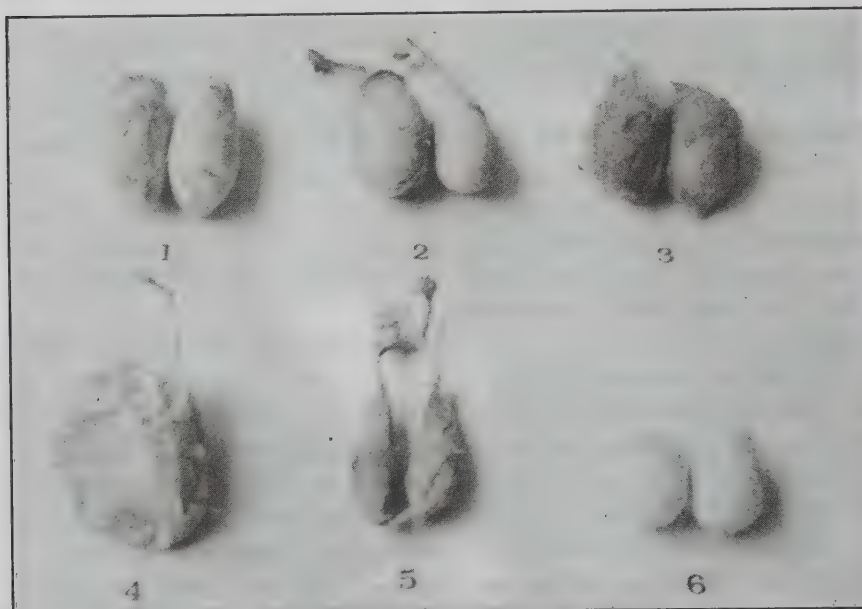
*Antheraea siwalica* (Tasar) : A Survey was conducted by Nagarota & Jwalaji for the collection of *A. siwalica* cocoons during August, 1995. About 119 cocoons were collected on *Ziziphus mauritiana* and *Terminalia arjuna*

from the Kangra valley (Fig. 1). Cocoons were hard and grey in colour with an average cocoon weight of 9.2 g along with 16.4% S.R. (Table 1). The area from where cocoons were collected is situated between 530 and 560 m altitude with subtropical climatic conditions.

*Antheraea royle* (Wild Oak Tasar) : During the commercial rearing of *A. Proyle jolly*, 15 larvae of the *A. roylei* were collected on the *Quercus semecarpifolia* plants from Winch and Billing area of Mandi and Kangra districts respectively during June, 1995. The cocoons were double shelled with a weight of 13.2 g (Fig. 1 and Table 1).

Winch and Billing areas are situated at high altitudes (8200') with temperate climatic conditions.

*Philosamia cynthia* (Wild Eri): *P. cynthia* is a wild eri silkworm which is not so far used for commercial purpose. Its another species *P. ricini* (eri silkworm) is domesticated and reared in North-eastern region especially by the tribals and other weaker sections of the society. Since there is no



**Fig. 2. Cocoons of Sericigenous insects - [1] *Antheraea assama*, [2] *A. siwalica*, [3] *A. proyle* [4] *A. royle*, [5] *Philosamia cynthia* and [6] *Bombyx mori***



**Table 2. Food plants of sericigenous insects in Himachal Pradesh**

Name of Silkworm	Food Plant	Vernacular Name	Family	District
Tasar	<i>Terminalia alata</i> Syn. <i>T. tomentosa</i>	Asan	Combretaceae	Mandi, Una
	<i>T. Arjuna</i>	Arjun	Combretaceae	Kangra, Mandi
	<i>T. bellirica</i>	Bahera	Combretaceae	Kangra, Mandi
	<i>T. chebula</i>	Harar	Combretaceae	Kangra, Una
	<i>Anogeissus Latifolia</i>	Dhawa	Combretaceae	Kangra
	<i>Bauhinia variegata</i>	Kachnar	Caesalpiniaceae	Chamba, Shimla
	<i>Bombax ceiba</i> Syn. <i>Salmaclia malabarica</i>	Semul	Bobbacaceae	Kinnor, Shimla
	<i>Careya arborea</i>	Kumbi	Lecythidaceae	Kangra
	<i>Carissa caranda</i>	Laruncha	Apocynaceae	Shimla
	<i>Celastrus Paniculatus</i>	Malkangni	Celastraceae	Mandi
	<i>Dodonaea viscosa</i>	Aliar	Sapindaceae	Bilaspur, Solan, Una
	<i>Ficus bengalensis</i>	Berged	Moraceae	Kangra, Shimla
	<i>F. religiosa</i>	Pipal	Moraceae	Shimla
	<i>Lagerstroemia indica</i>	Saoni	Lythraceae	Solan
	<i>Ricinus communis</i>	Erandi	Euphorbiaceae	Kinnor, Kangra
	<i>Syzygium cumini</i>	Jamun	Myrtaceae	Sirmur, Una, Chamba, Mandi, Hamirpur
	<i>Ziziphus mauritian</i>	Beri	Rhamnaceae	Chamba, Kangra, Kulu, Kinnor, Shimla
	<i>Z. jujuba</i>	Beri	Rhamnaceae	Chamba
	<i>Quercus incana</i>	Ban	Fagaceae	Chamba, Kangra, Mandi, Kinnor, Shimla
	<i>Q. Semecarpifolia</i>	Kharsu	Fagaceae	Chamba, Kangra, Mandi, Kinnor, Shimla, Kulu, Lahualspiti
	<i>Q. dilatata</i>	Moru oak	Fagaceae	Chamba, Kinnor, Kulu, Shimla, Mandi
	<i>Q. ilex</i>	Brechur	Fagaceae	Kinnor, Shimla
Oak Tasar	<i>Q. glauca</i>	Banni	Fagaceae	Chamba, Kangra, Kulu, Shimla
	<i>Q. undulata</i>	Banni	Fagaceae	Kulu
	<i>Q. prinus</i>	Banni	Fagaceae	Shimla
	<i>Q. robur</i>	Banni	Fagaceae	Kulu
	<i>Q. rubra</i>	Banni	Fagaceae	Kulu
	<i>Ricinus Communis</i>	Erandi	Euphorbiaceae	Kinnor, Kangra
	<i>Ailanthus altissima</i>	Barkesseru	Simaroubaceae	Kulu, Shimla
	<i>Coriaria napalensis</i>	Makola	Coriariaceae	Kinnor, Kangra, Kulu, Shimla
	<i>Zanthoxylum Armatum</i>	Tejphul	Rutaceae	Chamba, Kangra, Kinnor, Kulu, Lahulspiti, Mandi, Shimla
	<i>Ziziphus mauritian</i>	Beri	Rhamnaceae	Chamba, Kangra, Kinnor, Kulu, Shimla
	<i>Sapium sebiferum</i>	Vilayati shisham	Euphorbiaceae	Kangra, Kulu, Mandi
	<i>Pyrus pashia</i>	Kaith	Rosaceae	Chamba, Kangra, Kinnor, Kulu, Shimla, Solan
Muga	<i>Litsea monopetala</i> Syn. <i>L. polyantha</i>	Soalu (Guan)	Lauraceae	Shimla, Kangra
	<i>L. salicifolia</i>	Diglotti	Lauraceae	Kangra
	<i>Machilus odoratissima</i>	Bansom	Lauraceae	Chamba, Kinnor, Kulu
	<i>Michelia Champaca</i>	Champa	Magnoliaceae	Shimla
	<i>Symplacos paniculata</i>	Ludh	Symplocaceae	Chamba, Kangra, Kinnor, Kulu, Shimla
	<i>Zanthoxylum armatum</i>	Tejphul	Rutaceae	Chamba, Kangra, Kinnor, Kulu, Lahulspiti, Mandi

Name of Silkworm	Food Plant	Vernacular Name	Family	District
Wild	<i>Ziziphus jujuba</i>	Beri	Rhamnaceae	Chamba
	<i>Z. mauritiana</i>	Beri	Rhamnaceae	Chamba, Kangra, Kinnor, Kulu, Shimla
	<i>Zanthoxylum armatum</i>	Tejphul	Rutaceae	Chamba, Kangra, Kinnor, Kulu Lahulspiti, Mandi
	<i>Mangifera indica</i>	Aam	Anacardiaceae	Kangra
	<i>Coriaria napalensis</i>	Makola	Coriariaceae	Ksangra, Kinnor, Kulu, Shimla
	<i>Prunus cerasodes</i>	Paddan	Rosaceae	Chamba, Kangra, Kinnor, Lahualspiti, shimla
	<i>Syn. P. puddum</i> <i>pyrus pashia</i>	Kaith	Rosaceae	Chamba, Kangra, Kinnor, Kulu, Shimla & solan
	<i>Pyrus communis</i>	Badam	Rosaceae	Chamba, Lahualspiti
	<i>Syzygium cumini</i>	Jaman	Myrtaceae	Chamba, Hamirpur, Mandi, Sirmur, Una
	<i>Careya arborea</i>	Hand bobera	Lecythidaceae	Kangra
Mulberry	<i>Clerodendrum infortunatum</i>	Bhant	Verbenaceae	Mandi
	<i>Salix tetrasperama</i>	Jalmala	Salicaceae	Shimla, Solan, Lahualspiti
	<i>Morus alba</i>	Sahtut	Moraceae	Kangra
	<i>M. australis</i>	Sahtut	Moraceae	Shimla
	<i>M. Serrata</i>	Sahtut	Moraceae	Chamba, Kinnor, Kulu, Shimla

organized eri market in the area, most of the cocoons produced are consumed for domestic use.

However, *P. cynthia* cocoons were collected on *Pyrus pashia* plant during the second week of May from Palampur area. They were grey in colour and small (3.0 cm) in size (Fig. 1). However, the average cocoon weight was 2.32 g with 16.81% SR (Table 1).

### Cultivated sericigenous fauna

*Antheraea proyle* and *A. pernyi* (*Oak tasar*) : *A. proylei* and *A. pernyi* are domesticated and reared on *Quercus incana* at low altitude and on *Q. semecarpifolia* at high altitude in Kangra and Mandi districts. The rearing performance and cocoon characteristic of both the species are almost similar (Table 1).

*Bombyx mori* (*Mulberry*) : It is cultivated throughout the state except in Lahulspiti and Kinnor districts. The cocoon production is about 30 kg/100 dfls. The main food plants are different varieties of cultivated mulberry. The co-

coon characteristic of these silkworms are indicated in Fig. 1 and Table 1.

### Sericigenous Flora

*Muga* : *Litsaea monopetala* is the primary food plant, distributed in Shimla and Kangra valley upto 4500' altitude. In Kangra valley, much variation is there in the plant population. The nearest food plant such as *L. salicifolia* is distributed in Kangra and Machilus odoratissima in Chamba, Kinnor and Kulu districts. The other food plants available in the state are shown in Table 2.

*Tasar* : *Terminalia arjuna* and *Ziziphus mauritiana* are the primary food plants available in Kangra, Kinnor, Chamba, Kulu and Shimla districts and the others are secondary plants (Table 2).

*Oak tasar* : *Quercus semecarpifolia* and *Q. incana* are the primary food plants. They are distributed in Kangra, Kinnor, Chamba and Mandi districts. The other suitable food plant (*Q. serrata*) was introduced from

Manipur to Kangra and Mandi districts. Other *Quercus* species are secondary food plants (Table 2).

*Eri* : The primary food plant of *P. ricini* is *Ricinus communis* (*Erandi*) which is mainly distributed in Kinnor, Kangra and in lower districts of the state and other plants such as *Ailanthus altissima* (*Barkesseru*) in Kulu and Shimla districts. The primary food plant of wild *Eri* silkworm (*p. cynthia*) is *Pyrus pashia* (*Kaith*) distributed in Kangra, Chamba, Kinnor, Kulu, Shimla and Solan districts. Other food plants are tabulated in table 2.

*Mulberry* : The Endogenous species of mulberry are restricted to some districts while the other cultivated varieties are throughout the state except Lahulspiti and Kinnor districts (Table 2).

### Salient features

The collection and growth performance of the important species of *A. assama* and other species of *Antheraea* and



**Table 3. Meteorological data of Palampur Area  
(Avg. of 1992 to 1996)**

Month	Temperature °C			R.H. %	Rainfall (mm)
	Max.	Min.	Avg.		
January	14.1	5.1	9.6	52.2	99.7
February	16.6	6.7	11.6	48.9	90.4
March	19.7	10.2	14.9	48.1	102.1
April	24.5	13.9	19.2	39.6	56.5
May	29.4	18.1	23.7	39.5	60.3
June	31.0	20.1	25.5	46.6	144.8
July	26.3	19.8	23.1	77.3	512.2
August	25.6	19.8	22.7	81.3	571.7
September	25.7	17.8	21.7	72.2	249.0
October	24.8	14.2	19.5	47.3	16.1
November	21.8	10.5	16.1	44.0	7.0
December	18.1	7.5	12.8	42.9	24.0

Source : Himachal Pradesh Agriculture University, Palampur, Kangra Dist.

*Philosamia cynthia* showed that Kangra valley is ideal for conservation of these varieties due to :

- Suitable climatic condition for survival
- Availability of nature grown food plants
- Better cocoon characteristics

#### **Constraints in Muga cultivation in North-east**

- Lack of systematic plantation
- Absence of ideally suitable plant varieties
- Absence of Germplasm Bank (GPB) of food plants and silkworms

- Lack of knowledge for maintaining the bush plantation
- Absence of specified seed zone
- Uncertainty of crop due to environmental conditions
- Low multiplication rate of cocoon and vice-versa
- Cocoon and plants loss due to pests and diseases
- Absence of stable race of muga silkworm
- Lack of information on genetic variability of muga silkworm and their food plants

#### **Suggestions for improvement**

- The muga food plants mainly

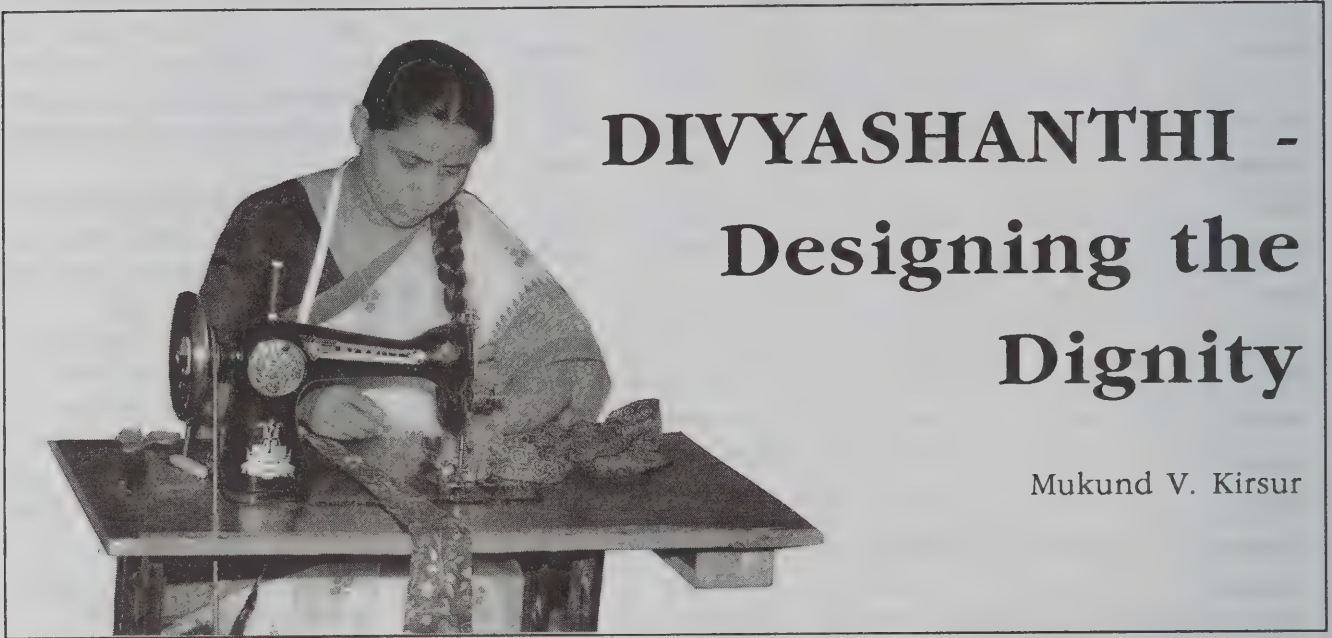
*Litsaea polyantha* or its synonymy which are distributed not only in the North-east, but also in Himachal Pradesh, Uttar Pradesh and other parts of the country should be identified.

- Suitable food plants should be collected and GPB should be maintained similarly for Oak tasar food plants also.
- Suitable varieties of food plants for silkworm should also be identified through rearing.
- The species of muga silkworm should be collected from Himachal Pradesh and Uttar Pradesh and maintain in a GPB, similarly for other sericigenous insects also.
- Genetic variability of both the food plant and silkworm species should be studied.
- Hybridization programme between different morphotypes of *Machilus bombycina*, *Litsaea* and *Antheraea* species and regional races should be carried out, which will not only improve the quality and quantity of silk, but also provide the suitable plant material and stable race of silkworm.

*The author is with Research Extension Centre of Central Tasar Research and Training Institute, Palampur, Himachal Pradesh.*

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# DIVYASHANTHI - Designing the Dignity

Mukund V. Kirsur

**I**ndia is now regarded as one of the major suppliers of high quality apparels/accessories including silk. Coupled with this, consumers' willingness to pay better prices for the right kind and quality materials, has opened up new vistas for the Indian silk manufacturers and exporters. While majority of the businessmen view this situation as an opportunity to develop their business, few organisations like Divyashanthi Trust encash such an opportunity for the benefit of the society especially, the downtrodden.

The trust with a humane face has established several educational institutions from primary to high school level, orphanages, hostels for boys and girls, transition homes, work centres for women etc. The main objective is to help improve the socio-economic conditions of the downtrodden, especially the women covering education, training and health programmes, in particular. Founded in 1984 by Reverend P.K. Samuel, Divyashanthi Trust identifies itself with social work and has its head

office in Bangalore with branches at Hyderabad and Ooty.

The silk ties made here are quite popular and are being exported. Besides ties, the unit also produces diversified and specialised products like:

- Ladies garments - skirts, churidars, midies, maxies, gowns and so on in silk, cotton and polyester
- Children garments

- Baby's items like nappies, bibs etc.
- Cross stitch and embroidery work (both in silk and cotton)
- Leather items like wallets, bags, belt, portfolios, passport holders etc.

The profit earned goes to the developmental and social activities of the organisation. According to Shri John Anukoolam, the spokes-



*Skill of the trainees manifested in different shapes*



man, the handicrafts and garments unit was set up mainly to create job opportunities for the local women, to help them access to resources and skills so that they could better their living standards. "Women Work Centre" is the brain child of Mrs. Samuel and about 25 women are trained in the Centre, says Ms. Priyadarshini Singh, the Co-ordinator.

"Some of the girl-dropouts from school and college are also trained at the centre. While a few of them are absorbed in the organisation, others find a place in garment and leather industries. Few more take up tailoring on their own. The training covers mainly the ladies wear and children's garments. After the training, they have to appear for a public examination from Karnataka State Secondary Education Board to get a certificate. Women are trained in all aspects of tailoring - pattern drawing, pattern making, stitching, finishing etc.", explains Mr. John.

As far as ties are concerned, the unit produces on an average, 160 ties a day. "Though, we make dupion ties, they work out quite costly. That is why we make them only on demand. The price of the ties depends on the weight of the silk used and workmanship. The unit procures silk from Co-optex



Madras, Karnataka Handloom Development Co-operation and some private parties in Bangalore and get them printed locally as per design specifications and requirements in demand. The unit manufactures ties both for domestic and export markets. For exports, the range must be competently, clearly and comprehensively structured.

"We manufacture ties manually whereas some of the leading tie manufacturers use sophisticated machines. This shortcoming of ours has led to a situation wherein



## **The First Knot**

Necktie is a band of cloth or a bow worn around the neck. Mainly meant for the men, it might have come to use to get more protection from the vagaries of cold in the western countries. But, later it turned to be more attractive and convenient to wear by getting a formal shape. The four-in-hand and bow ties worn today have been about the same style since they were first worn in 1870's. The neckties took a cue from the neckclothes wrapped or folded around the neck of men. Now also people especially the sports men use it. Earlier, a ribbon was also tied over it to hold the ends in place. During the end of the 19th century, this fashion prevailed in Europe. A 17th century report says that men wore a white bone stock. They used to fasten it in back with a strap or buckle and tied it with a bow or a knot in the front.

The cravats were often frilly and lace trimmed during 16th and 17th centuries. In the mid of the 18th century, the cravats were replaced by narrow string ties. During 1870's people preferred wider four-in-hand ties for general wearing. The black string ties were preferred for formal wear, the soft windsor ties for sports and the white bow ties for evening wear. It is only during 19th century that formal black bow ties appeared and more conservative men usually wore black string ties.



**Quality seeks concentration**

we cannot afford to meet the large demands. Moreover, our aim is to provide job opportunity to our people. Mechanisation may have negative impact on this idea. We have to balance both the aspects", he feels. "Besides, in Western countries, especially in Europe,

practically everyone uses a tie mainly because of the cold climate. On the contrary, in India, tie is rarely worn because of the hot climate. Mostly on special occasions, ties are used, hence, domestic demand is less. The competition is quite stiff, however, of

late, due to the entry of multinationals, the demand for ties is on the increase", he asserts.

"There are about 15 employees in the unit and they are diverted to other units like garment and handicrafts, whenever there is not much work in the tie making unit. In a sense, all our trainees are allrounders", he tells proudly.

## **Making of ties**

The unit manufactures different types of ties i.e., bow ties, regular neck ties etc. in cotton also. On an average, four ties of 2.5" width or three ties of 3" width can be made from one metre fabric.

The tie making, in fact, involves a number of steps. Broadly speaking, the printed fabric is hand-cut according to the size/specification using templates. Accordingly, the lining is also cut using the handloom cotton fabric. In the next step, fusing of lining using a white feasible is carried out. This step is quite important where synchronization should be perfect. Then the lining is put inside the tie and, the first ironing is performed to keep them in perfect position as well as to avoid wrinkles. Later, stitching is done and second ironing is carried out. Finally, the ties are packed in polythene packets.

Divyashanthi Trust is exporting silk ties, mainly to United Kingdom. As far as local marketing is concerned, the unit participates in various exhibitions and has its regular customers.

Yes, Divyashanthi is helping the socially depressed people, women in particular, not only to be self-reliant, but also self-dignified.

**The author is with Indian Silk, Central Silk Board, Bangalore.**

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# Eri Culture : Nature's Gift

Alok Sahay, B.K. Singh, Sarat Deori and P.K. Mukherjee

**B**rahamaputra valley of Assam and its adjoining foot hills in the sub-Himalayan belt is believed to be the native of domesticated eri silkworm *Philosamia ricini* and its wild counter-part *Philosamia cynthia* which is possibly the parent species.

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**Eri culture, mainly confined to the North-eastern region of the country, can be propagated to major castor growing states of Andhra Pradesh, Gujarat, Karnataka and Orissa. These states grow 'castor' - the primary food plant of eri silkworm, solely for its seed oil. Practising ericulture without affecting the yield of castor seeds in these states, will help enhance the income of the farmers. The authors dovetail the vast potential of ericulture vis-a-vis its bye-products utilisation.**

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The word 'Eri' is probably derived from the Assamese word *Era* or *Eranda* which means 'castor'-the primary food plant of eri



Fig. 1. Eri silkworm pupae

silkworm. Eri culture is believed to have originated in India. The North-eastern region which is also known as seven sisters of India, is contributing 96% of the total eri raw silk production of the country involving around 1.20 lakh families. These families mostly belong to SC/ST and economically poorer sections of the society who are inhabiting all states of the region except Tripura (Table 1).

The people of this region have been practising eri culture from time immemorial, primarily to meet the demand of warm clothing and also for the consumption of pupae. Besides, it provides gainful employment to small and marginal farmers. Eri culture is also practised in other states viz., Bihar, Andhra Pradesh, Orissa and West Bengal, though to a lesser extent.

Eri silkworm *Philosamia ricini* is polyphagous in nature and feeds primarily on Castor (*Ricinus communis*) and Kessuru (*Heteropanax fragrans*). Eri silkworms also thrive on a wide ranges of secondary host plants, of which Tapioca (*Manihot utilissima*) and Payam (*Evodia farnifolia*) are considered important from economic point of view.

The conducive climatic condition prevalent in North-eastern region sustains luxuriant growth of host plants on which eri silkworms thrive. Several factors such as abundant availability of nature grown host plants, multivoltine nature of eri silkworm, low cost rearing, insured crop and simple traditional spinning devices have encouraged rearers to take up this culture as a commercial proposition. In addition to eri yarn, this



culture supplements various valuable bye-products which help significantly in boosting the economy of poor rearers. Some of the valuable bye-products are :

### Pupa as nutritious food

Tribals of north-eastern region viz., Rabhas, Boros, Garos, Khasi, Nagas, Adis, Mizos and Syntengs consume eri pupae with delicacy of taste to supplement their food protein requirement as eri pupae are supposed to be a rich source of protein. The bio-chemical analysis reveals that the pupae are of highly nutritive value as they contain about 60% crude protein, 26% total Lipid, 5-8% free amino acids. Among the protein groups the major proteins reported in Eri pupae are citrulline, cystine, Methionine, Asparagin, B-Alanine, Homoarginine and Hydroxy proline. Further investigations on Lipid fractions (Glycerol trioleate, neutral lipid, phospholipid, cholesterol) indicate the presence of high amount of free unsaturated fatty acid which have diversified functions in the physiology of living beings. The other valuable

Table 1. Spread of Ericulture in North-eastern region	
State	Districts
Assam	Kamrup, Goalpara, Darang, Kokrajhar, Sonitpur, N.C. hills, Karbi Anglong, Lakhimpur and Golaghat.
Meghalaya	Garo hills, Ri-bhoi and West Khasi hills.
Manipur	Imphal, Chandel, Chuchandpur, Tamenglong, Senapati and Thoubal.
Mizoram	Aizwal, Lunglei and Chintuipui.
Nagaland	Kohima, Mokokchung, Wokha and Zunheboto.
Arunachal Pradesh	Lohit, Khonsa, Papumpare and Tirap.

constituents reported in the eri silkworm are Vitamins (Pyridoxal, Riboflavin, Thiamine, Ascorbic acid, and Folic acid), calcium, iron and phosphorus.

The tribals who were consuming eri silkworm pupae for their taste, were unknowingly consuming rich protein food material which has of late been proved by the scientists. Now, they have been recognised as proteinous food. Unlike other silkworms, eri worms form cocoon which is open at one end. The rearers have the habit of taking out pupa from the cocoon in the pre-pupal stage and sell them in the local market at a price ranging from Rs. 25 to 60/- per

kg. As eri cocoons cannot be reeled and generally spun like cotton, the removal of pupa at pre-pupal stage not only maintains cleanliness of yarn, but also facilitates smooth spinning.

### Silk gland as surgical tools

The silk gland of eri silkworm can be stretched up to 3 to 4 mtrs. long with good tensile strength. It has been fully utilised in medical sciences by converting into surgical guts, which have utility as sutures. Presently, Spain is the only country in the world which is producing surgical guts out of silk glands.

### Litters as effective inorganic manure

Eri silkworms get their water requirements for smooth conduction of metabolic activities through succulent food plants. Therefore, there is always a need for conservation of water existing in the silkworm which is duly performed by the cryptonephric device. Due to this, the urine comes out in a very concentrated form that too along with the litters is only. The concentration of the uric acid in litters is very high enabling them to be used as an effective inorganic manure specially for the ornamental plants. Besides, the litter powder is also used as an effective insecticide in paddy fields.

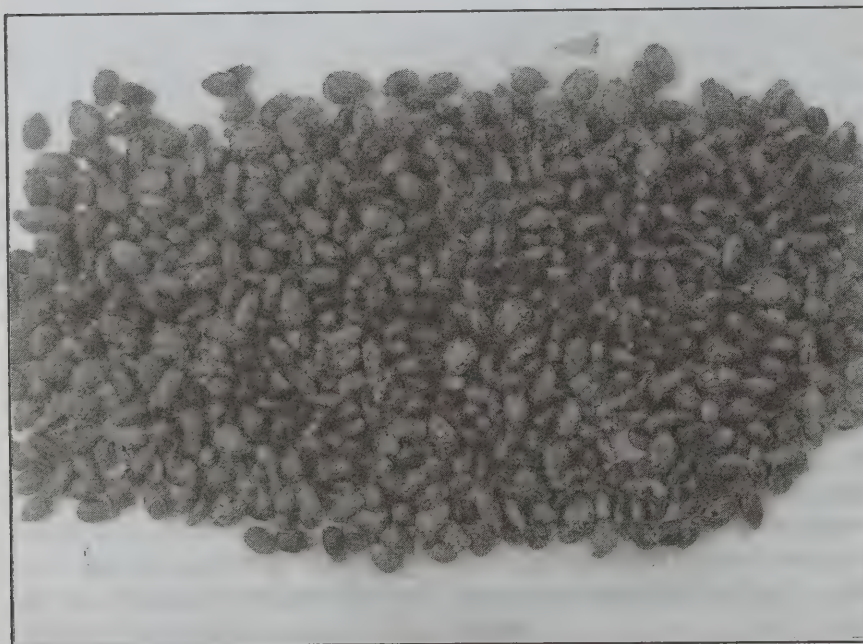


Fig. 2. Castor seeds



### Castor seeds- valuable raw material for industries

The food plants of eri silkworm, *Ricinus communis* produce seeds which are used for extraction of castor oil and oil cake. Castor oil is a very valuable commodity which is used in the manufacture of soap, medicine, lubricating detergent, coating, wetting agent etc. The total production of castor seeds in the region is about 8000 tons (Fig. 2).

The oil content of the castor seeds of this region is comparatively low in comparison to the oil content of the seeds of Rajasthan region where the rainfall is less than the N/E region because the oil content in castor seeds has a direct relation with the rainfall. Oil cake which is prepared from the 4.5% Nitrogen content is precious fertilizer as well as effective pesticide. Due to this hidden quality of the oil cake, it is being used

Table 2. Effect of leaf plucking on the leaf/seed yield		
Leaf plucking	Leaf yield (Kg/ha)	Seed yield (Kg/ha)
25%	4,000	440.30
50%	8,750	350.00
75%	12,072	230.00
None	—	452.00

in sugar cane and rice cultivation as fertilizer as well as pest controller. Of late, the castor oil cake is effectively being used in horticulture and floriculture also.

### Tapioca tuber-as a consumable

The major secondary food plant of eri silkworm, *Manihot utilissima* is a perennial shrub which is propagated through cuttings. It has thin straight stem which forms big tubers. The tribes of the region propagate this plant for dual benefits i.e. the foliage of the plants are used for rearing of the worms and the tubers of the plant are consumed as food material (Fig. 3).

The tubers contain 82.9% carbohydrate, 1.5% protein and 2.1% other contents in dry state, where as in wet stage the percentage is 38.2%, 0.1%, and 1.1%, respectively.

Besides these constituents, the tubers contain 25% starch. Therefore, they are also being used in the manufacture of starch, sago, Glucose, Dextrine. In southern part of India the tapioca tuber is widely consumed as a delicious snacks. In addition, 1/4 of the total demand of starch in India is fulfilled by the Tapioca tuber. This starch is also considered as an important biomass ingredient because through it 'Gasohol' is produced which has a unique importance in the present energy crisis, if exploited properly. In one hectare plantation around 10 to 15 tons of tubers are produced.



Fig. 3. Tapioca host plant with tubers



## Prevalent misapprehension

Ninety three percent of castor production in India comes from Andhra (67.2%) followed by Gujarat (12.7%), Karnataka (7.1%) and Orissa (5.8%). These states practice castor culture mainly for extracting castor oil which fetches them only 36% profit in which the foliage wealth of vast castor flora remain unexploited.

The only reason behind non-exploitation of castor foliage by means of Eri silkworm rearing seems to be the misapprehension of getting less yield of castor seeds from the eri silkworms reared on castor plants. On the contrary, the findings of CEMR & TI, Titabar during eighties proved that plucking of 25% of castor leaves for silkworm rearing does not affect much on the castor oil seed production (Table-2). This fact has also been supported by the findings of Mishra (1987), who stated that 40% defoliation of matured leaves at monthly intervals and converting them into silk through eri silkworm rearing provides 16% higher revenue (i.e., Rs 11,403/- as compared to Rs 9517/- on oil seed production per hectare).

## Estimated gain from flora

The availability of total castor

leaves has been estimated to the tune of 9200 million kg. out of 9.2 lakh ha. castor plantation raised oil seed production in various states. If 25% of the leaf yield is used for silkworm rearing, about 2300 million kg of leaves would be made available for the rearing of 192 million dfls which would produce about 15,336 m.tons cocoons @ 8 kg/100 dfls and 95,850 m.tons pupae @ 50 kg/100 dfls.

In other states, the pupae may be converted into poultry or fish feed which would generate an additional income of Rs 517.59 crore @ Rs 150 per kg of cocoons and Rs. 30 per kg pupae.

Since 10,000 kg of leaves are sufficient to rearer 840 dfls, 192 million dfls can be reared on afore-said available leaves which can provide employment to 1.9 million people where a man can earn additional Rs 3000 per annum with 100 dfls rearing during agricultural off-season with an expenditure of Rs 275/- on rearing equipments per crop.

## Eri as a viable proposition

The present production of 800 mt. eri raw silk in the region forming 96% of the country's total production, is the sole contribution of the farmers by practising

Eri culture in a traditional way without research and extension support from the Govt. agencies.

Keeping in view the interest of the farmers, congenial environment, scheme on augmentation of Eri Food Plants was launched by the Central Silk Board in four North-eastern states viz., Assam, Meghalaya, Mizoram and Nagaland during the VIII Five year plan. As a result, systematic plantations are made available to the farmers on which they are able to rear 300-400 dfls/year against the earlier 50-75 dfls/year. The cut cocoon yield has also improved from 4-5 kg/100 dfls to 8-10 kg/100 dfls, thereby enabling the farmers to earn about Rs 10,500/acre/year against Rs 1500 in the traditional method.

If eri culture is introduced in a big way in the states where castor is grown as oil seed crop, the existing vast castor flora can be effectively exploited both for eri silk and castor oil with judicious plucking of leaf coupled with proper planning. It will not only generate additional income to the farmers, but also boost the country's raw silk production, manifold.

*The authors are with Central Silk Board, Guwahati.*

*The author is with the Central Silk Board, Bangalore.*

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# Vegetable Disinfectants for Tasar Eggs

K.B.G. Patro, B.K. Nayak and C. Dash

Potentiality of tasar culture in India is immense because of the abundantly available nature grown food plants in the forest, skilled tribal manpower and an ideal climatic condition. It has been reported that in India during the last 25 years, tasar sector registered a growth rate slower than

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***Vegetable disinfectants have an edge over chemical disinfectants on account of their easy availability, economy and eco-friendly nature. Experiments have proved that tasar silkmoth eggs gain more vigour when disinfected with vegetable disinfectants. The article sheds light on the advantages of natural disinfectants over the chemical ones.***

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mulberry. The main reason cited is the non-availability of quality tasar silkmoth eggs in sufficient quantity and in right time.

Quality silkmoth eggs implies eggs that are healthy, viable and disease free. Generally, the eggs

are declared 'disease free' after Pasteurian method of microscopic examination of the moths. The disease free eggs are to be disinfected before distribution to tasar rearers.

Various chemicals have been used as disinfectants, among which important are formalin, potassium permanganate, copper sulphate, sodium hydroxide etc. Out of these, formalin is commonly used for its economy and availability. The eggs of *A. mylitta* are treated with 5% formalin solution for five minutes and are thoroughly washed in plain water thereafter. Treatment with 10% formalin for ten minutes was found to be significantly effective in reducing mortality due to viral as well as bacterial diseases and treatment with sodium hydroxide (0.5%) and formalin (10%) for ten minutes brought down the incidence of polyhedrosis to 11-12% from 53% as observed in the untreated lots. Reports on the use of potassium permanganate, copper sulphate and vegetable disinfectants on eggs of tasar silkmoth are entirely lacking. In this context, evaluation of effect of chemical *vis-a-vis* vegetable disinfectants on tasar silkmoth eggs seems to be of paramount importance.

## Process of disinfection

Seven varieties of disinfectants *viz.*, formalin, potassium permanganate, copper sulphate, turmeric, margosa bakhara and ordinary soap were used for study of disin-

fection of tasar silkmoth eggs. An untreated lot was kept as control. For studying the effect of each disinfectant egg (Dfl) of Daba and Sukinda eco-races were collected during the month of June from the grainage of State Tasar Research Station, Baripada. Eggs of Model and Nalia eco-races were collected from the tribals of Similipal forest. Every day, the experiment was conducted with 20,000 eggs (100 Dfls) per disinfectant.

For studying the effect of formalin, the eggs were rinsed in 5% formalin solution for 5 minutes and then rinsed in running water thoroughly. The eggs were then dried in the shade and allowed to hatch. Similar experiments were conducted with potassium permanganate (1%) solution and copper sulphate (1%) solutions, separately.

For studying the effect of margosa as a disinfectant, fresh leaves of *Azadirachta indica* (Family: Maleaceae) were plucked and ground to a fine paste in a rock cut grinder commonly found in most households of countryside India. The paste and the eggs were rubbed together gently between the palms for about 5 minutes. Then the eggs were rinsed in fresh water till the eggs cleared from the paste. The eggs were dried in shade and allowed to hatch. In case of turmeric (*Curcuma longa*, family Zinziberaceae), roots were washed cut into small pieces, crushed and ground thor-

**Table 1. Effect of different disinfectants on hatching of tasar silkmoth eggs (Mean percentage value)**

Nature	Eco-race	Formalin	Potassium Permanganate	Copper Sulphate	Turmeric	Bakhara	Margosa	Soap (TFM 43%)	Untreated (Control)
Wild	Modal	88.01 (4.18)	88.86 (4.63)	87.35 (5.08)	88.85 (4.65)	88.32 (4.99)	88.86 (6.18)	87.02 (5.11)	88.61 (6.92)
	Nalia	89.51 (2.16)	88.87 (4.26)	89.66 (3.93)	89.02 (5.29)	89.00 (5.79)	88.94 (2.49)	89.43 (5.08)	88.73 (3.88)
Semi domesticated	Daba	85.99 (3.76)	86.04 (6.86)	86.51 (5.17)	86.33 (5.51)	85.91 (5.43)	84.32 (5.49)	86.35 (4.67)	86.28 (3.84)
	Sukhinda	78.55 (6.01)	77.83 (5.55)	78.03 (4.30)	78.36 (3.47)	78.51 (4.59)	78.62 (8.36)	79.31 (3.26)	78.93 (4.03)

(Figures in parentheses are SD values)

oughly to prepare a paste. Preparation and treatment procedures were also similar as above. In case of bakhara, dried bakhara was ground to fine powder. Water was added to make a paste of the disinfectant. The eggs were then treated with the bakhara paste in the same manner as it was done in case of margosa.

In case of disinfection with soap (43% TFM), the eggs were placed inside a cotton cloth pouch. The pouch was wetted with water. Soap was rubbed gently over the pouch on all the sides uniformly. The pouch containing eggs was washed with water. Then the eggs were taken out and rinsed in fresh water. The eggs, after drying in the shade, were allowed to hatch.

The experiment was repeated for ten successive days. In each case, number of hatchlings were counted at the time of hatching and percentage of hatching was calculated and compared.

Everyday, 1000 hatchlings in each case were reared separately. Thus, a total of 10,000 larvae were reared (from DFLs of 10 successive days) per experiment on any particular disinfectant. In case of semi-domesticated eco-races, package and practices of tasar rearing were followed as per Jolly et al (1979) and Nayak (1988). The larvae were reared on

*T. alata* in the traditional rearing fields i.e. *adapahis*. In case of wild eco-races skilled tribals were employed for rearing in deep woods on *S. robusta* plants under close technical supervision.

Mean ERR% was calculated and compared. Similarly, 100 cocoons harvested from 1000 larvae were randomly collected for study of commercial traits. Thus, a total of 1000 cocoons were utilised on every disinfectant to

study the qualitative traits (*viz.* cocoon weight, shell weight, pupal weight, shell ratio and total silk production) by common gravimetric tests. The mean values are calculated and compared.

### Observations

Table 1 shows the mean percentage of hatching of eggs disinfected by different disinfectants of all the eco-races.

It was found that there were

### Neem

Margosa or *neem*, *Azadirachta indica* (Family: Maleaceae) is the famous medicinal tree of India. The mention of *neem* as a medicine in the ancient medical sciences 'Ayurveda' and 'Unani' is amply found. Each and every part of the plant is beneficial and used by every household in India. The countryside Indians use piece of *neem* twig as tooth brush. They also apply *neem* leaf paste on their body at regular intervals as a preventive measure against any dermal infections. *Neem* leaves or bark is consumed to kill intestinal parasites and also to purify blood. The oil extracted from *neem* is exclusively used in the preparation of disinfectant and antibiotic bath soaps, cosmetics, tooth paste, hair oil etc. all of which are commonly used. Malaria Research Centre in India is working on *neem* to use it to control malaria. According to the Indian Scientist, Dr. S.K. Upadhyay, intensive research is on full swing in India, USA and France to invent a preventive medicine from *neem* against the deadly HIV that causes AIDS. The *Indian Journal of Experimental Biology* reported that extracts of fresh leaves of *neem* have a distinct anti-anxiety effect. *Neem* contains 'nemonide' a compound that can be effectively used to kill about 300 different micro organisms. Many agro-chemical plants in India prepare biocides utilizing *neem* plant. Disinfectant liquid preparations are a recent introduction. To top it all, the idol of Lord Jagganath, the famous Hindu deity in Puri, Orissa, is carved out of no other wood but *neem* only.



no statistically significant differences in the uniformity of percentage of hatching among eggs disinfected with different disinfectants.

Just like the percentage of hatching, disinfectant wise significant difference among ERR%, cocoon weight, shell weight, pupal weight, shell ratio or total silk production was also not found and hence avoided. But comparison of commercial traits among the eco-races showed the wild eco-races to be superior to the semi domesticated ones (Table 2). The differences were highly significant.

Despite not having any significant disinfectant wise differences, it is desirable to analyse the nature of disinfectant and the probability of its slow yet profound effect considering the findings that the

**Table 2. Mean values of commercial traits of different tropical tasar eco-races in Orissa**

Nature	Eco-race	ERR (%)	Cocoon weight (g)	Pupal weight (g)	Shell weight (g)	Shell ratio (%)	Total silk production (g)
Wild	Modal	53.29 (3.46)	15.08 (0.19)	12.11 (0.20)	2.97 (0.11)	19.69 (0.72)	158.27 (10.37)
	Nalia	46.94 (4.12)	11.40 (0.81)	9.69 (0.79)	1.71 (0.14)	15.00 (1.45)	80.27 (10.25)
Semi domesticated	Daba	42.07 (1.65)	11.96 (0.18)	10.50 (0.22)	1.46 (0.05)	12.21 (0.58)	61.42 (2.18)
	Sukhinda	34.15 (0.95)	11.18 (0.43)	10.06 (0.40)	1.12 (0.07)	10.02 (0.60)	38.25 (1.89)

(Figures in parentheses are SD values)

vigour of the semi-domesticated eco-races viz., Daba and Sukinda is degrading where chemical disinfectants were largely used. On the other hand, long before the advent of modern science the tribal rearers had closely observed the

disinfectant nature of certain plant materials viz., margosa, turmeric, bakhara etc. and used them for disinfection of tasar silkmoth eggs. These materials are not only easily available and economical but also safe to use unlike chemical preparations.

Use of soap (43% TFM) to wash the eggs could clear the eggs from the meconium coating. Untreated eggs, though did not show any significant difference in the percentage of hatching, should be disinfected since the hatchling immediately after coming out of the egg, eats a portion of the egg shell before attempting to gourmandise the leaves of tasar food plant. If the egg coating happen to contain any pathogen, such behaviour would make way for infection.

It may be stated that in the past when use of formalin had not been introduced in the tasar sector, cocoon production both in quality and quantity was tremendous. The quality of tasar cocoons during the years, particularly in the semi-domesticated eco-races Daba and Sukinda, has deteriorated. On the other hand, in the wild eco-races Modal and Nalia no such deterioration has been noticed. It is plausible to predict that

### **Haladi**

Turmeric or *haladi* is a famous Indian medicinal plant belonging to the ginger family. The dictionary defines turmeric as an aromatic rhizome of an East Indian Zinziberaceous plant *Curcuma longa*. Its aromatic roots are powdered and used in a variety of ways. No kitchen in India is complete without having the powdered turmeric. The powder contains 'curcumin' (diferuloylmethane) which is the yellow pigment. Crushed turmeric roots are used as a stimulant medicine and also as a dye. It acts as a blood purifier, breath freshner, helminthecide etc. Hindu women apply *haladi* paste before daily bath. The paste not only acts against dermal diseases but also provides an eye catching glaze, probably the thin coat of *haladi* acts as a screen against harmful ultraviolet rays. Roots of *haladi* are chewed as a medicine to cure several diseases.

A turmeric antioxidant protein (TAP) isolated from an aqueous extract of turmeric was shown to inhibit unwanted lipid peroxidation in rats and thereby preventing premature aging. A study at the Rotgers State University of New Jersey implicated 'Curcumin' (the active principle of turmeric) to be an anti-inflammatory as well as anti-cancer agent. It is found that turmeric interferes in eicosanoid biosynthesis which are directly responsible for inflammation at the site of the wound. At the National Cancer Institute, Maryland clinical trial on AIDS patients have revealed that turmeric actually blocks the functioning of the HIV integrase enzyme (of HIV type 1) that is required for the pathogenesis of the disease. Thus, the use of *haladi* as a disinfectant is not only unquestionable but also precisely scientific. The tribals, the master learners of the secrets of the mysterious jungle have learnt and practised this since ancient times.

### **Bakhara**

*Bakhara*, the countryside vegetable disinfectant is prepared from roots of some unidentified plant in a crude fashion. The tribals are reluctant to reveal the identity of the plant or the secret formula of preparing the disinfectant. After much perseverance, it is learnt that they crush the roots of the plant and extract the juice. The juice is added to boiling water. After boiling for some time, the liquid is allowed to cool. The supernatant is used as country liquor whereas the residue is sun dried and stored for use as a disinfectant. It may be presumed that the crude root extract certainly provided an optimum and nutritious medium for the culture of the yeast cells. Study is under progress for identification of the plant.

disinfection of tasar silk eggs by chemicals is not favourable for the species. Though the effect is not reflected in a single crop, it is postulated that in the long run, chemical disinfectants interfered in the body physiology and gradually stimulated a repressive stress that led to loss of vigour. Supremacy of the vegetable disinfectants, on the other hand, has proven by the fact that they instead of interfering in the physico-chemical processes might have aided the embryo with certain energizing molecules that favoured the healthy growth of the juvenile. This was expressed by the superior quality of the wild eco-races. Though disinfecting material alone may not be the sole factor for such postulation, yet considering the degraded quality and vigour of Daba and Sukinda eco-races where chemical disinfectants are largely

practised, their detrimental effect cannot be repudiated altogether. The bakhara supernatant was presumed to supply abundant nourishment to the yeast cells which are micro organisms. The idea of occurrence of such mechanism between the developing embryo and the natural disinfectants during disinfection of tasar silkmoth eggs cannot, thus, be disavowed as such. Hence, it is extremely important to initiate intensive studies on exploiting the advantages of vegetable materials for disinfection of tasar eggs to protect the valuable quality of tasar silk cocoons, both wild as well as semi-domesticated eco-races.

*The authors are with E.S.S., Pottangi, Koraput, Directorate of Textiles, Bhubaneswar and School of Life Sciences, Sambalpur University, Burla.*

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# Silk Carpets of Kashmir

A.K. Dhar

**C**arpet weaving is a well-known handicraft in Kashmir. The oriental carpets have come to Kashmir via Iran/Persia and Central Asia in early 13th century during the period when different tribes in India and surrounding

***The carpets of Kashmir, famous for artistic creation and exquisite beauty, are making inroads into the export market and earning precious foreign currency for the country year after year. The carpet making is also a major handicraft venture providing bread and butter to many weavers. The author narrates the history and making of this 'master piece' of Kashmir.***

mountain areas were fighting for survival. In the meantime, poor craftsmen came to Kashmir via Hindukush and Afghanistan and took shelter in the valley for earning their bread. These craftsmen flourished under the patronage of



Fig. 1. 'Aath ghoda' design

the Moughal kings. Due to the foresightedness of king Zain-ul-Abadin, who was popularly called as BUDSHAH, the carpet industry got a fillip during his reign in Kashmir and attained its glory towards the middle of the 19th century.

The carpet manifests the allegorical language of the passions and the virtue of the people of Kashmir. Some of the artistic pieces depict life story of the famous personalities, the historical episodes, poetic fantasies, religious and philosophic themes. All this emanated from the mind

of the designer "the naqqash" who employ free hand with accuracy defying the use of the present day complicated geometrical apparatus. He has been inspired by nature. A masterpiece of Kashmir carpet, once so charmed, Maharaja Ranjit Singh, ruler of Kashmir that he involuntarily rolled himself on it in great joy. The ardbill mosque carpet was purchased for the Victoria and Albert Museum for 2000 pounds.

Silk carpet has emerged a major foreign exchange earner in the family of silk goods. The export of silk carpets has recorded foreign exchange earning of Rs.9273.52 lakh and Rs.9361.46 lakh during 1995-96 and 1996-97, respectively. The major markets are West Germany, Switzerland, Italy, France, U.K. and U.S.A.

## Loom

The loom used for the manufacture of silk carpet consists of two round wooden (deodar type wood) beams having a diameter between 1 1/2' to 2 1/2' and a length varying from 4 to 18' (2' - 4' for small sizes and 10' -18' for bigger sizes) depending upon the width of the carpets. Both the beams must have a smooth and even surface. The two beams are placed horizontally supported vertically by two wooden



planks of 3 to 4" thickness. There should be a difference of at least 4' to 5' between two beams which are tied by an adjustable, strong iron chain in order to rotate these wooden beams.

### Warping and setting

The warping and setting process on the loom take at least a week. The warp is usually made out of 9/20s cotton and mounted at the top beam of the loom and one end is tied to the lower beam on which the actual knotting takes place. The pile is knotted with silk yarn. The silk yarn (2/60s) dyed in different requisite colours is reeled on small round balls/cones and hung to hooks on the upper beam from where the strings are taken for knotting on the lower beams.

### Manufacturing

There are two ways of manufacturing a carpet, single knotting and double knotting methods. In the case of single knotting, one single thread (string) is taken from front layer of warp and one thread from back layer and one thread is passed through knots as weft. Generally, cotton yarn is used for weft. The carpet manufactured by

Export of Silk Carpets				
[Unit : Lakh; Qty:Sq. Mtrs.; Value: Rs.]				
Region	1995-96		1996-97	
	Qty.	Value	Qty.	Value
Asia	0.07 (5.82)	512.60 (5.53)	0.09 (8.57)	952.06 (10.17)
Africa	0.01 (0.61)	43.06 (0.46)	0.01 (0.95)	117.75 (1.26)
Japan & Others	0.03 (2.33)	279.20 (3.01)	0.02 (1.90)	296.61 (3.17)
East Europe	0.01 (0.58)	884.03 (9.53)	NEG 0.00	10.36 (0.11)
West Europe	0.95 (81.92)	6204.28 (66.90)	0.84 (80.00)	6442.95 (68.82)
U.S.A & Others	0.10 (8.73)	1350.35 (14.56)	0.09 (8.57)	1541.70 (16.47)
Total	1.16 (100.00)	9273.52 (100.00)	1.05 (100.00)	9361.46 (100.00)

Figures in parantheses represent the percentage to the total.

Exports of Silk Carpets		
[Unit : Lakh, Qty:Sq. Mtrs, Value: Rs.]		
Year	Qty.	Value
1994-95	0.91	6830.07
1995-96	1.16	9273.52
1996-97	1.05	9361.46

this process is exceptional. In the case of double knotting, two threads each are taken from front

and back layers and one weft thread is tied.

### Dyeing/clipping

Generally, dyed silk yarn is used for manufacturing a carpet. Mostly acid dyes are used for dyeing silk yarn. The original clipping is done when two or three rows of pile is knotted. Special type of scissors, knives and combs are used for clipping and other purposes during the purpose.

### Design

The design known as 'Talim', is drawn on the graph paper and transcribed on paper in codes. The numerator of the code denotes number of knots to be used. The head craftsman reads the coded script which his subordinates follow. Quality and value is determined by the number of knots per square inch and fineness of the material used. Design and patterns in Kashmiri carpet continue to be predominantly inspired by classical Persian and Central Asia rugs. Kashmir is



Fig. 2. A 'tree of life design' at the background





**Fig. 3. A cut piece work**

producing designs like Kashan, Kirman, Tabriz, Isfahan, Mashad, Bukharas etc. With such superb artistry, these can compete with the best in the regions of their origin.

Attractive local variations have also been evolved. After the entire weft line is knotted, twisted/un-twisted cotton is passed through the warp which serves as a binder for the weft already knotted. This process continues until the carpet is manufactured according to the specification.

### **Finishing**

After weaving of the carpet, it is washed with ordinary detergent powder. The carpet is taken and dried in sun light in summer and with the help of Bukharies (heating stove) in winter. Then the carpet is clipped again which makes pile even and design very clear. The fringes are later knotted to avoid losing away of threads in the carpet. The selvedeges are binded to give a final finish to the rug. If necessary, the carpet is ironed before final disposal.

**The author is with Central Silk Board, Bangalore.**

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# Italian Silk Industry in 1996

The Italian bachicultural season for the year 1996 was a source of certain worries and occupied the attention of the relevant ministerial departments. The preoccupations derived from the shortfall in cocooning of the silk-worms because of the use on fruit-trees of the 'Insegar' insecticide which, through its uncontrollable derivatives, deposited on the mulberry leaves, caused serious problems in this sector.

On the basis of the copious scientific documentaion which has been built up, the authorities concerned are being pressurised to withdraw the product which is incriminated and thus ensure the future of bachiculture which is of such great interest to farmers.

The production of cocoons obtained during the season was 23685 kg, giving 3600 kg of silk on a national level.

## Silk reeling, spun-silk and discontinuous fibre spinning

The market for silk waste and spun-silk yarns underwent a dramatic reduction in Italy in 1996, despite the drop which had already taken place in 1995.

Waste-silk imports dropped to 1551 ton, minus 38% compared with 1995. This cutback is partly due to lessened demand, but the main reason is the scarcity of the material on the international market.

Imports of spun-silk yarn (520 tons) showed a decline of 4.7%. In this case the drop is caused by lack of demand.

It is noteworthy that the drop in imports went hand-in-hand with a drop in national production, modest demand and the difficulty of finding raw materials.

The noil silk market remained more or less inactive. The market for open-end yarns underwent a reduction compared with the previous year.

Raw-material prices started to rise in the second half of the year whereas the price for spun yarns remained stable throughout the year.

In early 1997, there was a new price-rise on raw material and semi-processed goods accompanied by a scarcity of supply.

The demand for spun yarns remains low and prices are going down.

## Silk throwing

The Italian silk throwing indus-

try started the year 1996 under a veritable recession which in fact affected the whole European industry. It is an undisputed fact that households are consuming fewer textile articles, particularly made of silk. Fashion is ignoring this fibre with its prestigious image in favour of the use and the processing of fibres other than silk.

The overall production of the sector, estimated at 2065 tons in 1996, chalked up a drop of 4% as against the previous year.

However, the development was quite different from one sector to another. Crepes and thrown yarns for women's clothing are at present undergoing a serious crisis, as shown by a distinct drop in the quantities being processed. The yarn dyed sector, for ties, has remained very stable.

The firms working in the

Imports of Silk Products (1994-1996) (kg)			
Product	1994	1995	1996
Cocoons (dry weight)	7	-	2023
Raw silk	3813756	3252000	2927576
Waste silk (bulk)	3289882	1265000	477171
Other waste silk	2227108	1242000	1074138
Thrown silk yarns	572469	845000	585652
Spun silk yarns	1225245	644000	520300
Sewing thread	3354	5000	2898
Silk and spun-silk fabrics	2581181	2346000	2265559
Silk-noil fabrics	9480	6000	6317
Ladies dresses etc.	143312	74000	78266
Ldies blouses	642199	512000	376798
Handkerchiefs etc.	2018	2000	2650
Silk scarves	98314	57000	75750
Silk ties	37204	36000	47679
Total	14645529	10286000	8442777
Variation 1995/96 : - 17.92% (quantity)-15.66% (value)			
Source : U.I.S. from ISTAT figures MNL N° 193 July 1997			

Exports of Silk Products (1994-1996) (kg)			
Product	1994	1995	1996
Cocoons (dry weight)	—	8000	1360
Raw silk	33511	153000	117779
Waste silk (bulk)	147129	33000	41823
Other waste silk	41675	59000	56966
Thrown silk yarns	415429	358000	465724
Spun-silk yarns	481611	344000	251332
Sewing thread	46743	51000	35677
Silk and spun-silk fabrics	2650823	2586000	2520572
Silk-noil fabrics	28391	19000	15545
Ladies' dresses etc	36935	34000	48869
Ladies' blouses	148303	132000	113332
Handkerchiefs etc.	15164	15000	24683
Silk scarves	481032	440000	508185
Silk ties	1035998	1155000	1224591
Total	5562744	5387000	5426438
Variation 1995/96 : +0.73% (quantity) -0.97% (value)			
Source : U.I.S. from ISTAT figures MNL N° 193 July 1997			

throwing sector are strongly conditioned by and dependent on the accessory, tie fabrics, in the face of the considerable drop and the deep crisis in fabrics for women's outerwear, a significant part of

the activity.

Imports in general showed a decline and the flow of thrown silk imports in 1996 included 243 tons from China, i.e. a reduction of 34.3% over the previous year.

In 1996, exports of thrown silks generally increased, but exports to Japan, a traditional outlet, were down by 19.7% in quantity.

### Silk weaving

In 1996, Italian silk weaving came to the end of the positive cycle which had typified the two previous years 1994 and 1995.

In value terms, silk fabric exports were down by 8.5% and in volume 15.4%. Exports of ties were up by 3.4% in value and 5.5% in quantity. The European market showed a negative evolution but with varying trends according to each country.

In the Americas, the United States showed a decline of 3.5% in value and 5.5% in volume.

The Asian market also underwent a serious cut-back after the bullish trend of the previous years.

Production of silk fabrics worked out at 3200 tons, slightly

down (-3.5% roughly) on the figure for 1995.

The remarkable stability of this figure however masks the diversity of this production whether it is intended for men's accessories or women's clothing. Women's outerwear has continued to prove highly sensitive to consumers' preoccupation with the price factor.

Silk has also undergone some 'redimensioning' in the middle-upper range through the loss of its image because of the distribution of Chinese-made blouses with a low content in styling and creativity.

As for tie fabrics, they have remained generally stable at a high level, with yarn-dyed fabrics very much in view. Just like ties, scarves have also shown good results. The trend continued in the early months of 1997 and can be taken as the characteristic of this year.

### Trade in silk products

Activity in the raw silk trade was severely affected by the reduced demand from the weavers, especially for grey-fabric weaving, the production of which underwent a decrease estimated at 35% compared with the previous year.

Until November, the market showed signs of serious uncertainty but began to wake up a little following the Chinese announcement of reduced cocoon production, as well as some delayed deliveries and the prospect of a difficult supply situation in early 1997.

Imports of thrown yarns probably suffered as the weavers became increasingly aware of quality problems and the volumes handled moved downwards compared with the previous year.

Fabric also decreased, notably crepes, although there was relative stability as regards twills and jacquard fabrics.

(Courtesy : ISA News letter)

Silk statistics 1996		
		Tons
Fresh cocoons	Estimated production	23
	Imports	2
	Exports	1
Raw silk	Production	—
	Imports	2927
	Exports	117
Silk waste	Production	n.d.
	Imports	477
	Exports	41
Tops	Production	n.d.
	Imports	1074
	Exports	56
Thrown yarns	Production	2065
	Imports	585
	Exports	465
Spun silk and silk noils	Production	600
	Imports	520
Exports		251
Fabrics woven from raw, spun and noils	Production	3200
	Imports	2265
	Exports	2520



**interstoff.**

WORLDWIDE FABRIC & ACCESSORIES SHOW

## Autumn Interstoff in Frankfurt

The Autumn Interstoff '97, worldwide Fabric and Accessories show, will be held in Frankfurt am Main from November 11-13, 1997. At the forthcoming event, the Ideas Group, which currently numbers 34 companies from eleven countries, will be offering a spectrum of services encompassing not only product concepts, hardware product design, graphics and hand-made prints, but also trend advice, styling and brand establishment in active sports fashions, hardware/shoes, print graphics and marketing/publication.

Each member of the Ideas Group has many years of experience in tailoring and professional design as well as product management in the sportswear industry. In a rapidly changing market, sports and design can no longer be kept apart. The group's productive working relationship with the sports fashion industry covers all aspects from supervising the production of a prototype to preparing marketing and sales strategies. With its broad spectrum of international services, the Ideas Group is ready to provide 'doers' with theoretical and practical support.

A large number of exhibitors have registered for the ensuing event. The exhibitors number has already reached 469 companies, marking a 40% increase compared

to the Spring Interstoff '97. An analysis of the exhibitors reveals that 50% comes from Asia, 29% from Central and West Europe, 16% from East Europe and 5% from other regions.

The largest product group is mixed fabrics with 189 companies followed by silk aspects with 161 companies. Other products such as silk jacquard etc., also form a representative spectrum of international suppliers. The exhibitors include companies with fabrics

from the upper and middle quality segments. The focal point of the exhibits is on women's wear, followed by men's and children's wear.

The Interstoff also offers a useful fringe programme such as trend boards for yarns, colours, and fabrics, etc. Furthermore, the Interstoff will be on the 'Internet' from October of this year with comprehensive information for visitors and exhibitors. The Spring Interstoff '97 was attended by about 7,500 buyers from 90 countries.

## Field Day on Sericulture



**Shri Nagaraj, Asst. Director (Sericulture) speaking on the occasion**

As a part of celebrating the Golden Jubilee of Independence, a 'Field Day' was organised at Sivapura in Chamarajanagar on September 8, 1997 by the Regional Sericultural Research Station (RSRS), Central Silk Board, Chamarajanagar involving the State Department of Sericulture, Government of Karnataka.

The Joint Director, RSRS advised the farmers to adopt new techniques of mulberry cultivation and silkworm rearing and also to take up improved silkworm breeds for improving productivity and

higher returns. The Assistant Director of Sericulture stressed the role of technology and its dissemination for boosting cocoon productivity in rainfed area. Experts from CSRTI, Mysore and RSRS explained the measures and precautions to be taken for rearing improved silkworm breeds.

A field visit was also organised to a mulberry garden raised with bio-fertilizers by the adopted farmers of Sivapura village.

**Report: Joint Director, RSRS  
Chamarajanagar.**



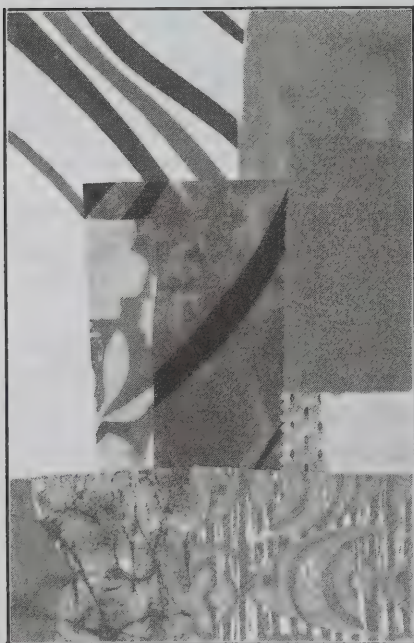
# Context India '97

## Greater emphasis

Keeping pace with the changes in the textile industry, Context India this year lays equal emphasis on the needs of domestic as well as international markets. The focus is on responding to the integrated needs while maintaining the product differentiation required for specific markets and end-users.

Context India '97 has highly specialised sections for each type of fabric according to its end-application. The main fabric categories are :

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- Fabrics for office wear and day wear
- Evening wear and party wear fabrics
- Prints and process houses for natural and synthetic fabrics
- Fibres
- Yarns
- Trimmings and embellishments
- Support services – like CAD/CAM systems, trade publications, fashion forecasting services etc.

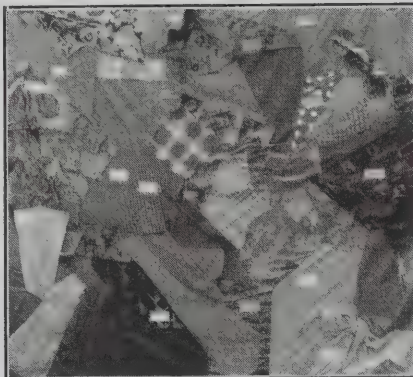


**Expected Summer '98 trends specific to the Indian market**

## TREND FORECAST

### Indian Market – Summer '98

With a view to cater to the needs of demands and expectations of the present day consumers, who are becoming more and more fashion conscious, sophisticated and selective, Context India '97 is starting 'Trend Forecasting for Domes-



**The Trend Forums**

tic Market' at this year's event which will be a recurrent feature.

Context India in association with Promostyl, one of the world's leading fashion forecasting houses, has developed fashion forecasts specially for the Indian markets in various categories like Day, Casual, Evening and Active sports wears for men, women and children.

The fashion forecast gives style directions in moods, colours, fabrics, trimmings and embellishments as well as silhouettes. The collections to be exhibited at the show are developed involving the leading Indian manufacturers and designers like Bhamini Subramaniam, Bhairavi Jaikishan, Salim Asgarally, etc and in tune with the Spring/Summer '98 trends for the Indian market.

### International Market–Autumn/Winter '98-99

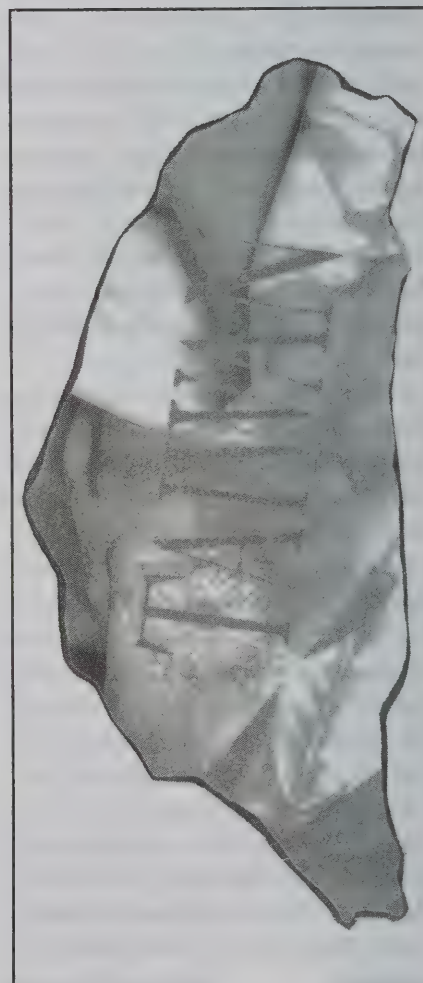
They have been developed for the export market in association with Promostyl for men, women and children in various categories like day, casual, evening and active sports wears.

These trends have been adopted to the vast Indian resources to make sourcing easier for foreign buyers, buying agents and garment exporters.

The exhibits at Context India '97 are trend accurate for European, American and developed Asian markets for the Autumn/Winter '98-99 season.

Trends ideas for fibres, yarns and colours for Spring/Summer '99 have also been developed for the export markets.

## Taiwan Participates



The Taiwan Textile Federation (TTF) participating in the Context India '97, with a view to assist Taiwan textile industry in promoting the South-west Asia textile market.



The export-oriented Taiwan textile industry has played a vital role in developing production value, job opportunity and foreign exchange.

It took Taiwan textile industry nearly 50 years to integrate all sectors related to textile, from fiber 'yarn' weaving to dyeing and finishing, into a complete and highly efficient manufacturing system. However, owing to the cut-throat global competitions, further efforts have been made to up-grade quality, designing and management.

India has been regarded as one of the principal manufacturing countries of textile and garments in South-west Asia. Considering the capability of Taiwan to produce quality textile goods, its participation will offer the chance of introducing its excellent textile products to the Indian market. Also, the contact of manufactures of both sides will help strengthen the mutual understanding and prompt business alliance.

At the Taiwan pavilion, 11 textile companies will focus mainly on variety of knitted and woven fabrics such as newly developed blend and interweaving, Lycra/stretch, prints, jacquard, lace etc.

## Golden Jubilee Exhibition



*Inauguration of RSRS stall*

The Regional Sericultural Research Station, Jorhat, Assam participated in the exhibition organised as a part of celebrating the Golden Jubilee of India's Independence by the District Administration at Jorhat from August 15-21, 1997.

Shri Sonaram, veteran freedom fighter, inaugurated the exhibition. Shri B.K. Pegu, Dy. Com-

missioner and Dr. Anadi Ram Baruah, Director, Extension Education, Assam Agricultural University, Jorhat visited the exhibition. Shri R. Chakravorty, Joint Director, RSRS explained to them about the reeling process of mulberry cocoons in the improved charka designed by CSTRI, Bangalore.

**Report : R. Chakravorthy, Joint Director, RSRS, Jorhat, Assam.**

## Electronic Trading Opportunity

The Electronic Trading Opportunity (ETO) system shares demand and offer of various products originated from different countries. Presently, the ETO system collects and disseminates trading opportunities among over 10,000 trade-related organisations in about 150 countries.

The ETO system has been developed by United Nation Trade Point Development Centre (UNTPDC) which is a joint subsidiary sub-organisation of the special programme on trade efficiency under UNCTAD responsibility.

Market Informatics Division (MarkInfo) of National Informatics Centre, Planning Commission, Govt. of India, is collecting these ETOs, using NICNET, from UNTPDC site at Melbourne, Australia, for the benefit of Indian trading community.

MarkInfo, after value addition, disseminates these ETOs through some of the Export Promotion Councils and Industry Associations. These ETOs currently reach over 51,000 traders in the country. It receives about 250 trading opportunities daily and

disseminates them via electronic mail only.

*Further details can be obtained from:*

Shri Kewal Krishan  
Technical Director,  
Market Informatics Division  
National Informatics Centre  
Govt. of India,  
A4B4 Bay, 3rd Floor,  
A-Block, CGO Complex,  
Lodi Road,  
New Delhi-110 003  
Tel. 011-4363622  
E-mail: Tradenic@hub.nic.n

## **Export Promotion Board Set up**

With a view to boost exports, the Hon'ble Prime Minister of India, Shri I.K. Gujral, has decided to set up a single-window Export Promotion Board (EPB). Apart from interacting with exporters in solving their problems, the Board plans to smoothen out interministerial problems relating to exports.

The Board, set up on the lines of the Foreign Investment Promotion Board, will include secretaries of Finance, Commerce, Industry, Textiles and Surface Transport Ministries.

The decision was taken in response to the demand made by exporters to set up such a Board after holding meetings with several Ministries and representatives of the Apex Chambers and Export Organisations.

The EPB is not only expected to have powers to issue directions to the concerned Ministries to solve problems but also take decisions concerning all export-oriented problems. Simplification and streamlining of customs procedures, particularly through electronic data system will be looked into. The system has been operational in Delhi and by the year end, all major ports will follow suit.

*(Source: Silknet)*

## **International Conference on Wet Processing**

A three-day international conference on Recent Advances in Wet Processing is proposed to be organised by the Bombay Textile Research Association (BTRA) at

its premises during February, 1998.

The conference will encompass the latest developments taking place all over the world in the sphere of chemical processing, viz., bleaching, dyeing, printing, finishing etc. Experts from India and abroad will take part in the deliberations.

*For further information, contact:*

Bombay Textile Research  
Association (BTRA).  
LBS Marg,  
Ghatkopar (West)  
Mumbai-400 086.  
Fax: 22-5000459

## **TEXCON '97 The World Conference on Textiles**

Texcon '97 – a three-day international Conference on textile and clothing, will be organised at IIM, Ahmedabad from 14–16th December, 1997.

The conference will focus on the post-WTO challenges faced by the world clothing and textile industry. In the light of the WTO agreement, it is imperative to fully comprehend the new challenges and developments in the global textile markets.

The conference with a unified approach to all sectors of clothing and textiles, will cover some key topics such as :

- What is holding back Indian textiles industry ?
- Industry's views on strategic options and recommendations.
- Panel discussion on strategy for growth-lessons from success abroad.
- Is free global textiles trade a myth ?
- Garments an engine for growth strategies for global competitiveness.

This unique conference for top decision makers of the industry segments like fibres, spinning, weaving, knitting, processing, garment manufacturing, retaining, textile consultancy, etc. will provide an opportunity to share the views of some eminent visionaries, professional and government representatives.

The conference has been organised by the confederation of Indian Industry (CII) in co-operation with Ahmedabad Textile Mills Association, Ahmedabad Textile Industry Research Association, Indian Woollen Mills Federation, Northern India Textile Mills Association, Southern India Mills Association and Clothesline group.

*More details can be obtained from :*

Confederation of Indian Industry  
23, Institutional Area,  
Lodi Road,  
New Delhi – 110 003  
Tel : 462 9994-7  
Fax : 462 6149/463/3168#/-

## **State Secretary Visits RSRS, Jorhat**

Shri Mridul Baruah, IAS, Secretary, Department of Sericulture and Handloom, Govt. of Assam visited the Regional Sericultural Research Station (RSRS), Jorhat, Assam on July 4, 1997. The Secretary evinced interest in the research and extension activities of the station and stressed the need for further research to improve the quality of cocoons.

**Report : R. Chakravorthy,  
Joint Director, RSRS, Jorhat,  
Assam.**



## India Knit Fair and Knit Tech '97

India Knit Fair (IKF) will bring together the Knitwear manufacturers under one roof from November 27-29, 1997 at the IKF complex in Tirupur, Tamil Nadu to unveil the Autumn/Winter '98 Knitwear collections. The event is jointly organised by the Apparel Export Promotion Council and the Tirupur Exporters' Association.

Knit-Tech '97, a national event for knitting technology will also be held here from December 5-9, 1997. Organised by Hi-Tech Trade & Technical Consultants, the exhibit profile comprises of knitting/processing machinery, boilers, stitching/embroidery machines, printing techniques, accessories like sewing threads, elastic tape, yarns, dyes and chemicals, packaging machinery, effluent treatment technologies, etc.

(Source: Clothesline)

## Heimtextil '98

Heimtextil '98, the annual trade fair for home and household textiles, will be held in Frankfurt from January 14-17, 1998, which is the leading exhibition in this sector in the world.

The 1997 edition of Heimtextil attracted nearly 65,000 trade visitors from more than 110 countries. According to the Federal Association of the German Textile industry, 65,000 is an outstanding result for the business in view of the fundamental structural changes and concentration process taking place.

The event is being organised by Messe Frankfurt who also manages home and household textile fairs in the USA, such as:

- Boston Curtain and Drapery Show '98 at Boston (February).
- World of Home Fashion '98 at

Orlando, Florida (date yet to be finalised).

- World of Window coverings '98 at Baltimore (March 20-22).
- Home Textiles Americas '98 at Miami (May 15-17).

*Further details regarding Heimtextil '98 can be obtained from:*

Messe Frankfurt GmbH,  
Postfach 150210, 60062  
Frankfurt Main

Tel : +49-69-75750

Telefax: +49-69-75756433

(Source: Silknet)

## Japantex '98

The 17th Interior Fabrics Show 'Japantex '98' will be held at the Tokyo International Centre from January 28-31, 1998.

Japantex has established itself as the definite meeting place for the interior fabrics and related products. Reliable business contacts and representatives are important anywhere in the world, particularly in Japan and the event, being the hub of Asia-Pacific interior fabrics industry, provides ample opportunities to develop such contacts.

The spectrum of products to be found at the show will extend from interior fabrics such as curtains, carpets, wall hangings, art work, handicrafts, fashion products, etc.

Japantex is organised by the Nippon Interior Fabrics Association (NIF) which has received the Japanese Govt. support for developing the industry.

*For details, contact :*

Nippon Interior Fabrics Association (NIF)

Fukuda Bldg., 6F, 2-3-23,

Hamamatsucho,

Minato-ku, Tokyo 105

Tel: (+81) 3-3433-4521

Fax: (+81) 3-433-7860

E-mail: nif @ net. ksp. or. jp

Web site: <http://www.ksp.or.jp/nif>

(Source: Silknet)

## SAMAB in Milano

The SAMAB, International Clothing Industry Machinery and Accessories Show, will be held in Milano, Italy from March 11-14, 1998. The event being held every third year, provides an opportunity for the trade operators to acquaint themselves with the state-of-the-art in the fashion industry techniques. Besides, they will also come to know the future trend and finally look at the clothing industry of the year 2000.

The show is all the more important since it takes place in Italy, the main market in Europe and a reference market in the world. Milano is the hub of business activity with SAMAB forming a unique meeting point for suppliers and users of advanced technology.

This quality show presents a full range of products introduced by major world manufacturers covering the entire manufacturing cycle from traditional cutting units to CAD/CAM systems, fabric spreading to sewing machines, ironing and pressing units, embroidery machines, fusing presses, labelling and material handling systems, etc. At the forthcoming event, information technology in the clothing industry will be the theme of special section.

The ninth SAMAB will introduce a number of new exhibits. About 400 exhibitors will show the latest developments of their range. Visitors at the eighth event were almost 20,000, a lot of them from 58 countries. At the forthcoming event, the number of visitors is expected to go up further – a reason not to miss this meeting with technology for the clothing industry of the new millennium.

*For more details, contact :*

SAMAB, Ente Fieristico SAMAB,  
Segreteria Generale: Via Fabio,  
Filzi, 27-20124 Milano, Italy.

Fax: (02) 669 11 74

(Source: Indian Textile Journal)

## Handicrafts & Gifts Fair

A 4-day 'Indian Handicrafts and Gifts Fair' will be organised in Bangalore from 3-6th April, 1998. Organised by the Export Promotion Council for Handicrafts under the aegis of the Union Ministry of Textiles, the fair has been recognised internationally as the best source for Indian handicrafts.

Leading exporters will be displaying a variety of handicraft and gift articles at the fair. Prominence will be given to the handicrafts from the southern part of the country which is the centre of a wide variety of handicrafts such as silk and cotton made-ups, wood, metal and stone crafts, fashion jewellery, etc.

The fair, which is an annual event at Delhi for the last 4 years, was organised in Bangalore for the first time in September, 1996, to promote the handicrafts of the southern region of the country and it was a success and business of nearly, Rs. 40 crore was transacted.

The forthcoming fair is being widely, published abroad to attract foreign buyers. The fair will be open only to business visitors and no retail sale will be allowed. The event will provide an opportunity to exhibit the various southern crafts such as silk and cotton made-ups, rugs and dhurries, colonial furniture, fibre handicrafts, perfumery, incenses, crochet, basketry and ratan hand-made paper, ikkat craft, etc. to the international market.

*For further details, contact :*

Ms. Sreekala Kadidal  
Co-ordinator, EPC for Handicrafts  
C/o. Regional Design & Technical Development Centre (Design Wing)  
No. 78, Church Street,  
Bangalore - 560 001  
Tel : 5091263/5091298

## Demonstration on Transfer of Technology



*Demonstration of rearing techniques to the farmers*

A Technology Demonstration-cum-Interaction Session on tasar culture was organised at a Research Extension Centre, CTR&TI, Bangripasi, Mayurbhanj district, Orissa on July 5, 1997.

Organised for the benefit of farmers, mostly tribals, the programme focused on tasar chawki rearing on developed plants, pollarding, pruning, improved methods of rearing, maintenance of plantation etc.

Shri M.O. Alam, Assistant Director, REC, explained the packages of new technologies and appealed to the farmers to adopt

them for improved quality cocoons and better returns. Shri S. Padhi, Branch Manager, OST&SCS Ltd., Keonjhar, spoke on cocoon marketing and price. Dr. B. Satpathy, SRO, REC, emphasised the role of technology for quality and better productivity.

More than 150 participants comprising 123 tribal farmers, scientists from RTRS, BSM&TC, Baripada and State Government officials attended the programme.

**Report: M.O. Alam, Asst. Director, CTR&TI, REC, Bangripasi, Orissa.**

### CSB Literature

In the background of growing interest in sericulture and silk industry in the country, there appears to be considerable demand for sericulture related literature. The Central Silk Board, in its service to the community of sericulture and silk industry publishes from time to time brochures, books, periodicals not only in English and Hindi but also in many Indian languages. Educative video cassettes on various technologies in Indian and foreign languages help you practise sericulture the right way.

For details, please refer to Indian Silk.  
Indent your copies, Today.



## Round Table Meeting on Sericulture Development in Asia

**T**he Royal Government of Thailand and the Food and Agriculture Organisation (FAO) of the United Nations jointly organised a Round Table Meeting on "Silkworm rearing, diseases control for sericulture development in Asia" from 16–19th September, 1997 at Khon Kaen in Thailand. The meeting was inaugurated by Mr. Kiatisak Tungkamane, Dy. Governor of Khon Kaen. The proceedings were conducted by Mr. Udorn Kajornwaeharth, Director General and Mr. Chavalvur Chainuvati, Dy. Director General of the Dept. of Agricultural Extension, Ministry of Agricultural and Cooperatives. Dr. J.S. Lim, Agriculture Industries Officer, FAO, Rome and Mr. Alastair Hicks, Senior Regional Agriculture Engineering and Agro Industries Officer from Regional Office of FAO, Thailand represented FAO in the meeting.

Dr. K. Thangavelu, Director, Silkworm & Mulberry Germplasm Station, Central Silk Board, Hosur, Tamil Nadu participated as a representative from India. Besides India and host country Thailand, China, Korea, Phillippines, Vietnam and Laos participated. The meeting received wide media publicity and attention of the traders in Thailand. Representatives from Chul Thai Agro-Industries Company Limited, Thai Nan Silk Company Limited, Jim Thompson Thai Silk, Thip Thai Silk Company limited, General Fam Supply Limited and Dev Silk took part. Also the various Departments of Royal Govt. of Thailand, representing Agriculture, Internal Trade, Public Welfare and scientists from Kasetsart University and Khon Kaen Univer-

sity attended.

The representatives presented their papers highlighting the present status of sericulture in their countries with emphasis on incidence of silkworm diseases, disinfection methods, rearing technologies, etc.

In the field visit, the delegates were taken to sericulture villages for interaction with the farmers. Later, the team visited Thai Silk Pavilion at Aumphur Chonnabot and Thai Silk Producing and Marketing unit at Aumphur Chonnabot and also Sericulture Extension Centre at Khon Kaen and witnessed mass scale production of mulberry saplings through grafting.

### **Conclusion and Recommendation**

In essence, the meeting aimed to promote sericulture development in Asia and create a framework for addressing problems related to silkworm rearing and diseases. The overall goal was to enhance the sustainability of sericulture activities as a viable means of livelihood for farmers in the region. The meeting generated conclusions and recommendations to adequately prevent or have a proper control of silkworm diseases.

Dr. Lim remarked that FAO, in collaboration with the United Nations Development Programme and other funding organizations, intends to continue assistance to developing countries in three major areas, provision of infrastructure and trained manpower; provision of germplasm from mulberry varieties and silkworm pure lines; and participation of the private sector in sericulture development and the development of markets.

The overall goal of the initiatives in these areas will be to reduce the production costs of cocoon and raw silk through improved technologies.

### **Identified guiding principles**

- Sericulture countries should take a stepwise approach to sustain the development of the industry.
- Cultivate a proper working relationship with the farmers that would facilitate introduction of techniques and methodologies for the prevention and control of silkworm diseases.
- There must be a common effort to prepare for the possible impact of GATT and WTO on the sericulture industry.
- When embarking on sericulture, countries must define their objectives. An analysis of internal capabilities and resources available should not be neglected while considering suitable silkworm varieties.
- In developing the strategy for silkworm disease prevention and control, the goal should be to maximize outputs and minimize inputs.
- Communication is the key to the success of the world sericulture industry. Continuing dialogue, building linkages and greater openness among sericulture countries are critical to the continuing growth and development of sericulture.
- The success of sericulture requires consistency of hard work.

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**Report: K. Thangavelu, Director, Silkworm & Mulberry Germplasm Station, Hosur, Tamil Nadu.**

## Training

### Training Courses of Central Silk Board

Institute	Course	Duration (Days)	Month(s)
<b>CSR&amp;TI, MYSORE</b> Central Sericultural Research and Training Institute, Central Silk Board, Srirampura, Manandavadi Road, Mysore South, MYSORE - 570 008.	1. Mulberry Cultivation Technique and Disease Control	30	Jan./Feb.
<b>CSR&amp;TI, BERHAMPORE</b> Central Sericultural Research and Training Institute, Central Silk Board, BERHAMPORE - 742 101 Dist. Murshidabad (W.B.)	1. Mulberry Crop Protection 2. Silkworm Crop Protection 3. Extension Education 4. Intensive Bivoltine Training 5. Chawki Rearing 6. Seed Technology 7. Mulberry Variety and Planting Technique	14 14 6 35 10 14 6	Jan. Jan. Jan. Feb. Feb. March March
<b>CSR&amp;TI, PAMPORE</b> Central Sericultural Research and Training Institute, Central Silk Board, P.B. No. 88, GPO, SRINAGAR - 190 001, J & K.	1. Intensive Bivoltine Training 2. Mulberry Cultivation Technique	45 5	March March
<b>CTR&amp;TI, RANCHI</b> Central Tasar Research and Training Institute, Central Silk Board, Piska Nagri, RANCHI - 835 303, BIHAR.	1. Refresher Training 2. Reeling and Spinning	14 6	Jan. Alternate Months from January
<b>SSTL, KODATHI</b> Silkworm Seed Technology Laboratory, Carmelram Post, KODATHI, BANGALORE - 560 035.	1. Seed Crop Rearing 2. Seed Production Technique	45 15	March March
<b>CSTRI, BANGALORE</b> Central Silk Technological Research Institute, B.T.M. Layout, Madivala, Hosur Road, BANGALORE - 560 068.	1. Silk Reeling Technique	30	Jan.

Note : For further details, please contact the Directors of respective Institutes.

Indian Silk is the best medium to carry your message to  
the sericulture and silk industry of the country.



# Guidelines for Bivoltine Rearing

India should go bivoltine. This is the refrain often voiced by the scientists and experts, if we have to be par excellence in silk quality that has international standards and acceptance. Besides, bivoltines produce quality silk, yield more and thus fetching higher returns.

At present, bulk of our silk production comes from multivoltines, the quality of which is not in consonance with the international yardstick. And, this is where bivoltine fits in.

Generally, bivoltine is a native of temperate countries. With the advent of technological innovations, bivoltine rearing has gained momentum in tropical countries also like India. The Central Silk Board has evolved/developed/introduced a number of bivoltines.

Despite having a congenial climate, enough manpower, suitable and affordable technology and wide extension network, still our bivoltine production is limited to a few tons.

Among many constraints that

are hampering the growth of bivoltine in India, 'Popularisation and adoption of technologies' is cited to be one of the prime factors. The efficacious diffusion of innovation is achieved, *inter alia* other factors, by effective extension, suitable publicity and publications.

Though a string of publications has been brought out in vernacular and English on the subject from time to time, yet 'Guidelines for Bivoltine Rearing' stands out for its simple but effective narration and lucid presentation. Published during the National Sericulture Project period, it is aimed at improving/updating knowledge and skill of the personnel engaged in bivoltine development and farmers, of course.

The publication encompasses important aspects like mulberry cultivation, package of practices of mulberry - both for chawki and late age worms, diseases and pest management, rearing houses, disinfection, incubation of eggs, rearing technology, mounting,

spinning and harvesting measures to prevent melting etc. in the form of briefs and tips with illustrations. Technical descriptions are avoided scrupulously to make the presentation simple and clear. 'Tips for successful bivoltine' form another hallmark.

Published in 10 Indian languages besides English, the book makes an easy reading with direct approach to the theme. The colour photographs and illustration are self-expressive.

Penned by Dr. R.K. Datta, Director, CSR&TI, Mysore, the 24 page 1/4 crown size booklet is published by the Central Silk Board, Bangalore and priced at Rs. 10/- per copy.

For copies, write to:

Member Secretary,  
Central Silk Board,  
CSB Complex,  
BTM Layout, Madivala,  
Bangalore-560 068.

(Mukund V. Kirsur and  
T.G. Rajappan, Indian Silk).

## ATTENTION

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Phone No. : 91 - 80 - 2269371, 91 - 80 - 2265780, Fax No. : 91 - 80 - 2258336

**Wanted agents in unrepresented zones and countries on attractive terms.**

# Textile Trade Fairs – 1997

<i>Date</i>	<i>Exhibition</i>	<i>Place</i>
1997 Oct 24-26	<b>INDIA</b> <b>CONTEXT INDIA</b> Fibres, Yarns, Apparel Fabrics, Trimmings & Embellishments, CAD/CAM and Support Services <i>Contact</i> : Clothesline Group Ph : 6338105, 6324798 Fax: 91-22-6332556	Mumbai
Nov 27-29	<b>INDIA KNIT FAIR</b> Knitwears for Autumn/ Winter '98 <i>Venue</i> : IKF Complex <i>Contact</i> : India Knit Fair Association Ph : 743049, 748763 Fax: 91-0421-749630	Tirupur
Dec 04-07	<b>INTERSTYLE INDIA- GARMENT TECH</b> Garment Machinery and Accessory <i>Venue</i> : Bombay Exhibition Center, N.S.E. Complex <i>Contact</i> : ANZ Int'l Trade & Marketing Associates Chennai-600068 Ph : 8283575 Fax: 91-044-8259552	Mumbai
05-09	<b>KNIT-TECH '97</b> Knitting Technology and Services <i>Venue</i> : Ramasamy Muthammal Thirumana Mahal <i>Contact</i> : Hi-Tech Trade and Technical Consultants Ph : 710092, 714604 Fax: 91-421-473545, 700752	Tirupur
1997 Nov 02-04	<b>OVERSEAS</b> <b>IGEDO DUSSELDORF + CORPORATE FASHION</b> Womenswear, Knitwear, Lingerie, Accessories <i>Venue</i> : Messegelände <i>Contact</i> : Indo-German Chamber of Commerce, Mumbai Ph : 2186131 Fax : 91-22-2180523	Dusseldorf Germany
03-05	<b>SITEC '97</b> Techtextile <i>Contact</i> : Miller Freeman Pte. Ltd. Singapore 189702 Ph : 2943366 Fax : 65-2947860	Shanghai China

<i>Date</i>	<i>Exhibition</i>	<i>Place</i>
05-07	<b>FILO</b> Weaving Yarn <i>Venue</i> : Centro Congressi Stelline <i>Contact</i> : Biella Intraprendere s.p.a. Biella Ph : 28138 Fax : 39-15-27124	Milan Italy
10-13	<b>PAKISTAN TEXTILE AND GARMENT INDUSTRY EXPO</b> <i>Contact</i> : CP Exhibition Wanchai Ph : 25117427 Fax : 852-25119692	Karachi Pakistan
11-13	<b>INTERSTOFF</b> Ready-to-wear Manufacturers <i>Venue</i> : Messegelände <i>Contact</i> : Indo German Chamber of Commerce, Mumbai Ph : 2186131 Fax: 91-22-2180523	Frankfurt Germany
18-21	<b>INTER SELECTION</b> Fashion Meeting for Wholesalers <i>Contact</i> : Interselection Ph : 47563232 Fax: 33-1-47563299	Paris France
20-23	<b>SIMEX '97</b> Machinery for Embroidery, Sewing CAD/CAM, Accessories <i>Venue</i> : Korea Exhibition Center <i>Contact</i> : Simex '97 Management Ph : 5511120/27/21 Fax: 822-5511311/13/1179	Seoul Korea
Dec 02-04	<b>MODA PRIMA</b> Clothing and Knitwear <i>Contact</i> : SVIP Ph : 89010020 Fax: 39-2-89010345	Milano Italy
02-04	<b>EXPOFIL</b> Yarns <i>Contact</i> : Expofil, 92113, Clichy Cedex Ph : 48206364 Fax : 33-1-48203566	Paris France
02-05	<b>MYANMAR TEXTILE AND GARMENT MACHINERY EXPO</b> Textile and Garment Machinery <i>Contact</i> : CP Exhibitions China Promotion Ltd., Wanchai Ph : 25117427 Fax : 852-25119692	Myanmar Burma
02-08	<b>SIMATEX</b> Fashion and Textile in Africa <i>Contact</i> : CICES BP 8166 ou 3329, Dakar Ph : 201011 Fax : 221-204605	Senegal Africa



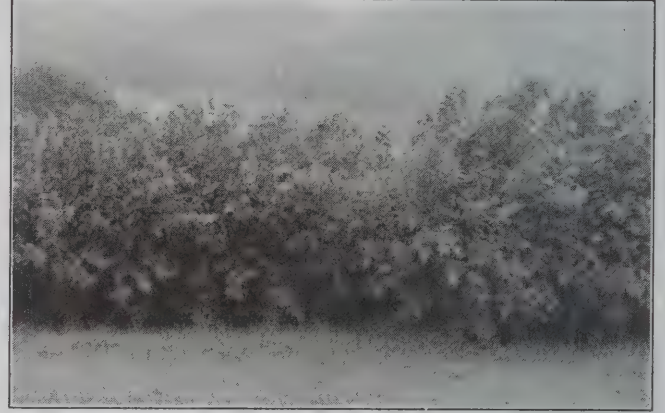
# Trade Enquiries

Sl. No.	Importers	Interested in
1.	Munir Garment Industry (NIG.) Ltd., 71A, Docemo Street, Idumota, Lagos, NIGERIA Tel : 234-01-2644526	Textiles/fabrics
2.	Bu.Ma. Tex. Boschstr. 51, 1190 Vienna, Austria Tel : +43-1-318-56-74 Fax : +43-1-318-56-72	Textile/Machinery
3.	Tototo Home Industries P.O. Box 1636, Mombasa, Nairobi Tel : 491702 (011) Fax : 491702	Textile Mfrs.
4.	Macthatan Handicraft P.O. Box 32324, Nairobi Tel. : 50208	Silk machinery for spinning
5.	Fair Rose Boutique P.O. Box 312, Ruiru Tel : 0151	Readymade garments
6.	M/s. Al Mubarak Trading Est Oilfield and Gas Services, Post Box 70126, Abu Dhabi Tel : 9712-771701 Fax : 9712-793613	Textile Fabric
7.	A Priori bvba De Burburestraat 14, 2000 Antwerp, Tel : 32-3-2381264	Cotton & Silk fabrics
8.	Calico Company Chaussee de Waterloo, 1037 1180, Brussels Tel : 32-2-374 1387 Fax : 32-2-3759996	Home furnishing textiles
9.	Coll Internacional R. Cal, AP47, 4457 Sra da Hora Codex Tel : 351 2 9530496 Fax : 351 2 9518650	Textile products
10.	M/s. Khalifa Al Suwaidi Gen. Trading Est. P.O. Box 31474, Dubai Tel : 9714 - 233788 Fax : 9714 - 236942	Textiles

# उत्तर-पूर्वी भारत में रेशम उद्योग पर एक नज़र

सत्यभान सारस्वत, राकेश पांडे, गार्गी एवं राजेन्द्र कुमार

दशकों पूर्व बृहत् असम से सात छोटे-छोटे राज्यों का अवतरण हुआ, असम, नागालैंड, मिजोरम, मेघालय, मणिपुर, त्रिपुरा एवं अरुणाचल प्रदेश। इन राज्यों का व्यावसायिक केन्द्र गुवाहाटी है जो सभी प्रकार के रेशमी वस्त्रों के क्रय-विक्रय का भी एक प्रमुख केन्द्र है। भारत में बृहत् असम ही एकमात्र प्रदेश है जहाँ सभी प्रकार के रेशम अर्थात् शहतूती रेशम, तसर, एरी, मूगा एवं ओक तसर का उत्पादन होता है। रेशम उत्पादन के लिए उत्तर-पूर्वी राज्यों को प्राकृतिक एवं सांस्कृतिक वातावरण विरासत में मिली है।



शहतूत का आर्थिक वृक्षारोपण

**भारत के उत्तर-पूर्वी क्षेत्र में विभिन्न रेशमों के उत्पादन का उल्लेख इतिहास के पन्नों में मिलता है। भौगोलिक अवस्थाओं व अन्य समस्याओं का उत्पादन पर प्रभाव तो अवश्य रहा है किन्तु, अनुकूल वातावरणीय अवस्था के कारण एवं विकासात्मक अभिकरणों के प्रयासों से रेशम उत्पादन को इस क्षेत्र में बल मिला है।**

## अनकूल जलवायु एवं वातावरण

रेशम उत्पादन की सफलता 50-60 प्रतिशत तक आदर्श जलवायु पर ही सम्भव है अर्थात् रेशमकीट पालन के लिए तापक्रम 20-30° सेग्रे. आवश्यक है तथा सापेक्ष आर्द्रता भी 60-90 प्रतिशत होनी चाहिए। उत्तर-पूर्वी राज्यों में वर्ष में कम से कम 8 माह अपेक्षित वातावरण एवं पूरे वर्ष रूक-रूक कर वर्षा होना रेशम उद्योग एवं रेशम कीटपालन के लिए प्रकृति की देन है।

## प्रचुर मात्रा में भोज्य पौधे

शहतूत की प्रजाति मोरस इंडिका जिसे स्थानीय भाषा

में नूनी कहा जाता है, की दो प्रजातियों यथा, जैती नूनी एवं मैसूर नूनी की खेती की जाती है। शहतूत की अन्य किस्में मोरस सिराटा एवं मोरस लैवीगेटा जो खासी पहाड़ियों में पायी जाती हैं, रेशमकीट पालन के लिए उपयुक्त नहीं होती हैं। केन्द्रीय रेशम बोर्ड के शोध परिणामों से प्रोत्साहित होकर उत्तर-पूर्वी राज्यों में शहतूत की नई प्रजातियों जैसे एस-1, एस-54, एस-799 इत्यादि के बागानों की स्थापना की गई है।

मूगा रेशमकीट के भोज्य पत्तों के वृक्ष सोम एवं सोआलू असम में बहुतायत में मिलते हैं जबकि एरी कीट के भोज्य वृक्ष कैस्टर, कसेरू एवं टैपियोका इत्यादि सभी उत्तर-पूर्वी राज्यों में उपलब्ध हैं। त्रिपुरा को छोड़कर अन्य उत्तर-पूर्वी राज्यों के लगभग 13.3 लाख हेक्टेयर क्षेत्र में ओक वन फैले हुए हैं।

## रेशमकीट की विभिन्न प्रजातियाँ

उत्तर-पूर्वी राज्यों में वारपट, सरूपत, मैसूर स्थानीय आदि शहतूत रेशमकीट प्रजातियों का पालन किया जाता है। केन्द्रीय रेशम बोर्ड द्वारा विगत वर्षों में नई द्विप्रज संकरों एवं द्वि एवं बहुप्रज संकरों को प्रचलित किया गया है।





प्रशिक्षण, सफलता का एक महत्वपूर्ण घटक

सोम और सोआलू पर मूगा रेशमकीट एन्थीरिया आसामा का, अरण्डी पर एरी रेशमकीट फिलोसामिया रिसिनी तथा ओक वृक्षों पर एन्थिरिया प्रौपली संकर कीट का पालन किया जाता है।

## वस्तु-स्थिति

**भौगोलिक अवस्थाओं का प्रभाव :** इन राज्यों में दूर तक फैली ब्रह्मपुत्र घाटी ऊँचे पहाड़ों से घिरी हुई है। घाटी एवं पहाड़ों की मिट्टी में स्पष्टतः काफी अन्तर है। पहाड़ों की भूमि की उर्वरता, उपस्थित नाइट्रोजन एवं कार्बनिक पदार्थों की प्रचुरता के कारण बेहतर है। परन्तु घाटी की भूमि में फास्फोरस कम तथा प्राप्य नाइट्रोजन एवं पोटेश मध्यम स्तर तक रहता है जिसका सीधा प्रभाव उत्पादकता पर पड़ता है।

पूर्वोत्तर राज्यों में प्रतिवर्ष औसतन 140-180 दिनों में, शहतूत फसल की दृष्टि से आवश्यकता से अधिक अर्थात् 1300 से 2000 मिमी. वर्षा होती है। साथ ही, पूर्वी राज्यों में पूर्वी हिमालय पर्वत की निकटता के कारण शीतकाल में न्यूनतम तापमान 5° सेग्रे. तक पहुँच जाता है जिससे सभी भोज्य वृक्ष सर्दियों में सुसुप्तावस्था में पहुँच जाते हैं। **संरक्षण की समस्या :** बीज कोसों के संरक्षण के दौरान बहुत-से बीज कोसे सड़कर सूख जाते हैं तथा अधिकांश तितली वहिर्गमन के पूर्व ही बर्बाद हो जाते हैं।

**विभिन्न रोग :** रेशमकीट वाइरोसिस, बैक्टेरियोसिस, माइकोसिस एवं पेब्रिन के प्रति संवेदी होते हैं। खाद्य पौधों पर भी बहुतेरे कीट, 40-50 प्रतिशत तक फसल को हानि पहुँचाते हैं। इन पौधों पर चूर्णिल आसिता, चकत्ता, गलन, कैसर, ऐंठन, काला रस्ट जैसे अनेक रोग संक्रामक रूप धारण कर रेशमकीट पालन में बाधक सिद्ध होते हैं।

## विकास के सोपान

उपर्युक्त समस्याओं का समुचित समाधान ढूँढ़ा जा सके तो उत्तर-पूर्वी राज्यों में रेशम उद्योग के विस्तार की पर्याप्त सम्भावनाएं हैं।

**अनुसन्धान एवं विकास :** केन्द्रीय रेशम बोर्ड के अनुसन्धान एवं प्रसार केन्द्रों द्वारा विगत कई वर्षों से शहतूत रेशम के लिए विकसित नवीनतम तकनीकियों का प्रदर्शन उत्तर-पूर्वी राज्यों में किया जा रहा है। बेहतर उत्पादकतावाली शहतूत किस्मों को लोकप्रिय बनाया जा रहा है तथा कीटपालन के दौरान बरती जानेवाली सावधानियों के संबंध में कृषकों को जानकारी दी जा रही है।

मूगा रेशम के उत्पादन में वृद्धि हेतु मूगा भोज्य पौधों का वृहत् स्तर पर कृषकों के यहाँ वृक्षारोपण कराया जा रहा है। दूसरी ओर, अम्बर चरखा द्वारा कताई से श्रेष्ठ गुणयुक्त एरी रेशम प्राप्त किया जा रहा है।

ओक तसर के क्षेत्र में विगत 25 वर्षों के अनुसन्धान एवं प्रसार के फलस्वरूप एन्थीरिया प्रायली संकर का पालन, कक्ष के अन्दर संभव है। बीजागार प्रक्रिया, अण्ड विसंक्रमण एवं अंडच्छेदन, चाकी एवं बड़े कीटों का पालन, कोसा-सृजन एवं बीजों के संरक्षण के लिए विभिन्न तकनीकियों का विकास किया गया है।

## बीज वितरण व्यवस्था

मूगा रेशमकीट बीजोत्पादन के लिए निर्दिष्ट परियोजना के अधीन रोगमुक्त रेशमकीट का उत्पादन व वितरण केन्द्र सरकार द्वारा किया जा रहा है। इसी प्रकार, शहतूती रेशमकीट बीजोत्पादन हेतु कार्यान्वित राष्ट्रीय रेशम परियोजना का लाभ किसानों को मिल रहा है। ओक तसर के बीजोत्पादन व वितरण का दायित्व क्षेत्रीय तसर अनुसन्धान केन्द्र, इम्फाल पर है।

## उज्जवल भविष्य

विगत कुछ वर्षों से स्थानीय राज्य सरकारों के क्रियात्मक सहयोग से पूर्वोत्तर राज्यों में रेशम उत्पादन हेतु विकास के प्रयासों में तीव्रता आई है तथा, विभिन्न राज्यों ने विभिन्न केन्द्रीय संस्थाओं के माध्यम से अपने कर्मचारियों के प्रशिक्षण की आवश्यकता को पहचाना है।

**लेखकगण पूर्वोत्तर रेशम विकास परियोजना, केन्द्रीय रेशम बोर्ड, वाराणसी (उत्तर प्रदेश) में कार्यरत हैं।**

# रेशमकीट पालन प्रसार शिक्षा एवं कीटपालक

आर. एस वर्मा एवं एन. सूर्यनारायना

**भा**रत विश्व का सबसे बड़ा द्वितीय रेशम उत्पादक देश है, और इसके निर्यात से प्रतिवर्ष भारी मात्रा में विदेशी मुद्रा (500 करोड़ रुपये) अर्जित की जाती है। भारत की 70 प्रतिशत जनसंख्या गांवों में निवास करती है जिनकी जीविका का प्रमुख साधन खेती-बाड़ी एवं आधारित कुटीर उद्योग ही हैं। रेशमकीट पालन एवं शहतूती कृषि को अन्य व्यवसायों जैसे, भेड़-बकरी पालन, खरगोश-पालन, मुर्गीपालन आदि की तरह प्राथमिकता देकर मिश्रित रूप से किया जा सकता है। ऐसा आंका गया है कि वर्ष 2000 में देश की जनसंख्या 1 अरब से भी अधिक हो जाएगी जिसके लिए न केवल खाद्यान्न ही चाहिए बल्कि रोजगार भी जुटाने होंगे जिसमें रेशमकीट पालन एक प्रमुख भूमिका निभा सकता है। आज, रेशमकीट पालन एवं इससे जुड़े व्यवसायों से करीब 60 लाख लोग अपनी जीविका अर्जित करते हैं।

**रेशम उत्पादन के विभिन्न क्षेत्रों में प्रयोगशालाओं में परीक्षण व प्रयोग हो रहे हैं जिनके परिणाम लाभकारी प्रतीत भी होते हैं। किन्तु, यह जानकारी जब तक कृषि-भूमि में साकार नहीं होती, इनका उद्देश्य अधूरा रह जाएगा। इस परिपेक्ष्य में, प्रसार कार्य की आवश्यकता निश्चय ही अत्यन्त महत्वपूर्ण परिलक्षित होती है।**

हालांकि रेशमकीट पालन अपनी उपयोगिता के कारण भारत के अधिकांश राज्यों में स्वतः ही फैल चुका है, रेशम उत्पादन संबंधित अनुसन्धान प्रयोगशालाओं में एवं कृषकों व कीटपालकों के उत्पादनों के बीच एक बड़ा अन्तर दीखता है जिसका एकमात्र कारण है, रेशमकीट पालन में प्रसार शिक्षा का अभाव। इस संदर्भ में, रेशमकीट पालन प्रसार शिक्षा का अभिप्राय जानना आवश्यक है।

रेशमकीट पालन प्रसार, रेशम कृषक, कीटपालकों एवं

अनुसन्धान संस्थानों के बीच की एक महत्वपूर्ण कड़ी है। यह प्रसार शिक्षा रेशम अनुसन्धान संस्थानों से रेशम कीटपालन एवं उत्पादन संबंधी नवीनतम सूचनाएं कृषकों व कीटपालकों तक पहुँचाता है जबकि उनकी समस्याओं के व्यावहारिक समाधान के लिए अनुसन्धान संस्थानों तक इस कार्य में, प्रसार कार्यकर्ता का योगदान महत्वपूर्ण होता है।

यह एक अनौपचारिक शिक्षा है जिसका मुख्य उद्देश्य है, रेशम कृषकों व कीटपालकों की परम्परागत एवं रूढ़िवादी विचारधाराओं में परिवर्तन लाकर व्यक्तिगत एवं सामूहिक रूप से उनकी सामाजिक एवं आर्थिक स्थिति में सुधार लाना।

## उद्देश्य

रेशमकीट पालकों एवं प्रसार कार्यकर्ताओं की क्षमता में अभिवृद्धि एवं उत्पादकता की दिशा में रेशमकीट पालन प्रसार के निम्नलिखित उद्देश्य हैं :

1. शहतूत पत्तों एवं रेशम कोसों की पैदावार में वृद्धि जो उन्नत कीट बीज, शहतूती प्रजातियाँ, कृषि यंत्रों का प्रयोग, हानिकारक कीड़ों, रोगों तथा खरपतवारों के प्रभावी नियंत्रण एवं अन्य उन्नत शहतूती शस्य क्रियाओं को अपनाने से सम्भव हो सकता है।
2. कृषकों व कीटपालकों के सामाजिक, आर्थिक एवं सांस्कृतिक ज्ञान का विकास।
4. भूमिहीन रेशमकीट पालकों, पिछड़ी जाति एवं स्त्री कल्याण से संबंधित कार्यक्रमों आदि का विकास।

## कार्यात्मक उद्देश्य

1. कृषक व कीटपालकों को नयी विकसित तकनीकियों से अवगत कराना।
2. कृषक व कीटपालकों में सामूदायिक विकास की भावना को जगाना।
3. कीटपालन गृहों की सफाई से संबंधित कार्यकलापों एवं विधियों की जानकारी प्रदान करना।



4. समय-समय पर कीटपालकों की गोष्ठी का आयोजन कर उनमें आत्मनिर्भरता की भावना का विकास।
5. हाल में विकसित संबंधित उपकरणों एवं औषधियों का प्रसार एवं विपणन कराना।
6. ग्रामीण सहकारी कीटपालन समितियों का गठन जो अनुकूल वातावरण में सामूहिक रूप से चाकी कीटपालन कर सकें।
7. कीटपालकों को विपणन संबंधी जानकारी प्रदान करना एवं कोसों के श्रेणीकरण के पश्चात् विपणन के लिए समयानुसार बाजार भिजवाना।
8. समय-समय पर गांवों में आयोजित सांस्कृतिक समारोहों में भाग लेकर, रेशमकीट पालन विकास की ओर अभिप्रेरित करना तथा नवीनतम एवं आधुनिक तकनीकियों का क्रमबद्ध प्रसार।

शहतूती एवं रेशमकीट पालन विकास के लिए यह आवश्यक है कि रेशम उत्पादन अनुसन्धान के परिणाम एवं उनके लाभ का प्रक्षेत्र स्तर तक बड़े पैमाने पर हस्तांतरण हो जो वर्तमान में एक बड़ी समस्या है जिससे लगभग 70 प्रतिशत प्रौद्योगिकी, अनुसन्धान संस्थानों एवं प्रयोगशालाओं तक ही सीमित रह जाती है।

रेशम कृषि प्रौद्योगिकी के रेशम ग्राम एवं कीटपालक तक समयानुकूल प्रसार के लिए रेशम कृषि विज्ञान केन्द्रों की स्थापना की जानी चाहिए। केन्द्र में कृषि व कीटपालन कार्यकलापों का पर्यवेक्षण, संबंधित उपस्कर एवं हानिकारक कीट एवं रोगनिरोधक रसायनों एवं औषधियों का विपणन,

### प्रसार शिक्षा की विशेषताएं

रेशम कृषि एवं कीटपालन-प्रसार शिक्षा खोखले प्रदर्शन, भ्रमण, प्रशिक्षण आदि की अपेक्षा विभिन्न विधियों द्वारा नवीनतम तकनीकी के बारे में वास्तविक व व्यावहारिक जानकारी प्रदान करती है जिससे उसका समुचित उपयोग हो सके।

कृषकों को शिक्षित करने एवं उनके विचारों में वांछित परिवर्तन लाने में काफी समय लगता है। अतः, इसकी आयोजना दीर्घाविधि होनी चाहिए।

प्रसार शिक्षा द्वारा किसी भी विकास कार्य को अपनाने के लिए कृषकों को बाध्य नहीं किया जाता वरन् प्रौद्योगिकी के महत्व के मूल्यांकन के पश्चात् इनका प्रयोग वे स्वयं ही करने लगते हैं।

प्रसार कार्य से सामूहिक आपसी सहयोग द्वारा रेशम-विकास कार्यों का विकास किया जाता है।

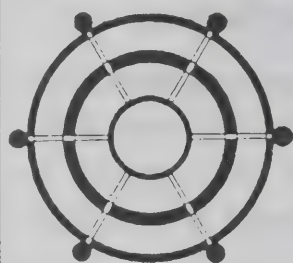
एवं अनुषंगी अन्य लघु उद्योग जैसे चन्द्रिका एवं कीटपालन ट्रे बनाना, कम्पोस्ट तैयार करना, पत्ती तोड़ने की टोकरियाँ बनाना, निम्न श्रेणी के कोसों से माले एवं खिलौने बनाने आदि का ज्ञान भी प्रदान किया जा सकता है। इन सभी विषयों का व्यावहारिक प्रशिक्षण देकर अनेक व्यक्तियों को स्वरोजगार प्राप्त कराया जा सकता है।

लेखकद्वय क्षेरेअके, अनन्तपुर (आन्ध्र प्रदेश) में कार्यरत हैं।

## स्वागत है

केन्द्रीय रेशम बोर्ड, राज्य रेशम उत्पादन विभागों एवं रेशम उत्पादन व उद्योग से संलग्न वैज्ञानिकों से अनुरोध है कि वे देश के रेशम उत्पादन की गुणवत्ता व परिमाण में सुधार लाने के लिए रेशम के खाद्य पौधों, रेशमकीट पालन, कोसा उत्पादन एवं कोसोत्तर प्रौद्योगिकी के विभिन्न क्षेत्रों में अपने उपयोगी प्रयोगों से सभी रेशमकर्मियों को अवगत कराएं। और, इसका सर्वश्रेष्ठ माध्यम है, इंडियन सिल्क पत्रिका।

प्रक्षेत्र स्तर पर कार्यरत कार्यकर्ता भी रेशम उत्पादन की विविध समस्याओं एवं उनके व्यावहारिक समाधान हेतु अपने विचार प्रस्तुत करें।



# Exports Review

Foreign exchange earnings of the Indian Silk Industry during the month of August '97 amounted to Rs. 7021.71 lakh compared to Rs. 8623.22 lakh during August '96 and registered a decrease of 18.6%.

## Review of Silkgoods Certified for Exports

During August 1997 and April to August '97 period of the year 1997-98

TABLE - I

### Export Performance of Indian Silk Industry

(Unit : Lakh ; Qty : Silkgoods ; Sq. Mtrs. ; Silkyarn/Silkwaste : Kg ; Value : Rs.)

Item of Export	August				% Increase		April to August				% Increase	
	1997		1996				1997		1996			
	Qty.	Value	Qty.	Value	Qty.	Value	Qty	Value	Qty.	Value	Qty.	Value
A. Silkgoods :												
(1) Mulberry												
(i) Dress Material	14.01	2446.70	19.23	3072.97	-27.1	-20.4	76.05	13325.35	79.39	12825.45	-4.2	3.9
(ii) Readymade Garments	6.76	1888.93	13.43	2643.34	-49.7	-28.5	18.96	6266.39	39.94	8387.88	-52.5	-25.3
(iii) Carpets	0.07	542.05	0.10	612.54	-30.0	-11.5	0.34	3092.01	0.35	2668.65	-2.9	15.9
(iv) Sarees	3.19	703.40	4.05	832.77	-21.2	-15.5	14.38	2972.12	15.89	2868.92	-9.5	3.6
(v) Scarves/stoles	4.46	496.19	7.01	677.17	-36.4	-26.7	24.20	2531.98	29.34	2802.99	-17.5	-9.7
(vi) Others	2.57	459.76	2.41	467.29	6.6	-1.6	10.94	2311.39	13.84	2263.00	-21.0	2.1
Mulberry Total [i to vi]	31.06	6537.03	46.23	8306.08	-32.8	-21.3	144.87	30499.24	178.75	31816.89	-19.0	-4.1
(2) Tasar	0.53	85.32	0.86	131.47	-38.4	-35.1	3.18	499.34	4.32	750.33	-26.4	-33.5
Total [1+2]@	31.59	6622.35	47.09	8437.55	-32.9	-21.5	148.05	30998.58	183.07	32567.22	-19.1	-4.8
(3) Mixed/Blended	2.49	360.04	1.93	185.41	29.0	94.2	9.92	1378.82	9.32	920.84	6.4	49.7
Total [1+2+3]	34.08	6982.39	49.02	8622.96	-30.5	-19.0	157.97	32377.40	192.39	33488.06	-17.9	-3.3
B. SILKYARN	Neg.	2.68	Neg	0.26		930.8	0.03	33.31	0.04	42.48		
C. SILKWASTE	0.19	36.64	-	-			2.21	379.34	0.04	5.98		
TOTAL [A+B+C]		7021.71		8623.22		-18.6		32790.05		33536.52		-2.2

@ Refers to total natural silk goods exports.

During April to August '97 period of the year 1997-98, foreign exchange earnings from silkgoods certified for exports amounted to Rs. 32790.05 lakh as against Rs. 33536.52 lakh during the corresponding period

of previous year and reflected a decrease of 2.2%.

Data on itemwise silkgoods certified for exports by Central Silk Board are given in Table - I.

Comparative data on region-

wise silkgoods certified for exports are given in Table-II.

### Natural silkgoods

During August '97, the natural silkgoods certified for exports amounted to 31.59 lakh sq. mtrs.

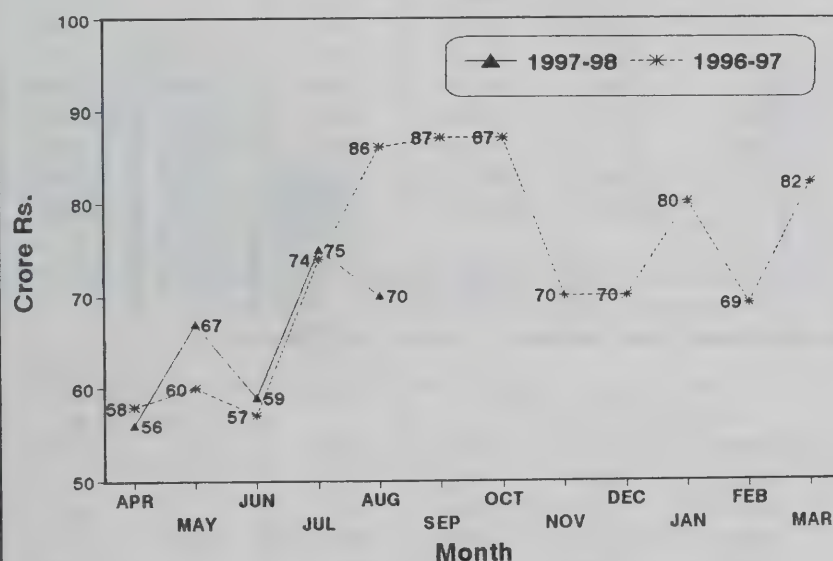


**Table - II**  
**Regionwise Silkgoods certified for exports**

[Unit: Lakh; Qty: Sq. mtrs; Value: Rs.]

Region	August						April to August					
	1997		1996		% Increase		1997-98		1996-97		% Increase	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
West Europe	12.09	2411.29	15.92	2933.06	-24.1	-17.8	67.01	13265.32	77.42	13568.99	-13.4	-2.2
U.S.A. & Others	13.12	2910.89	21.74	3808.39	-39.7	-23.6	51.75	12487.50	73.42	13797.55	-29.5	-9.5
Asia	7.33	1247.36	7.90	1279.08	-7.2	-2.5	31.69	4887.17	31.51	4286.01	-0.6	14.0
Japan & Others	0.73	208.13	1.16	319.81	-37.1	-34.9	3.42	835.96	4.35	993.47	-21.4	-15.9
Africa	0.76	187.96	0.51	85.06	49.0	121.0	2.80	738.54	2.85	513.47	-1.8	43.8
East Europe	0.05	16.76	1.79	197.56	-97.2	-91.5	1.30	162.91	2.84	328.57	-54.2	-50.4
Total	34.08	6982.39	49.02	8622.96	-30.5	-19.0	157.97	32377.40	192.39	33488.06	-17.9	-3.3

### Silk Export Earnings



valued at Rs. 6622.35 lakh as against 47.09 lakh sq. mtrs. valued at Rs. 8437.55 lakh during the corresponding month of previous year.

During April to August '97 period of the year 1997-98, the aggregate natural silkgoods certified for exports amounted to 148.05 lakh sq. mtrs. valued at Rs. 30998.58 lakh as against 183.07 lakh sq. mtrs. valued at Rs. 32567.22 lakh during the corresponding period of the preceding year.

### Mulberry silkgoods

During August '97, mulberry silkgoods certified for exports amounted to 31.06 lakh sq.mtrs. valued at Rs. 6537.03 lakh as against 46.23 lakh sq. mtrs. valued at Rs. 8306.08 lakh during August '96.

During April to August '97 period of the year 1997-98, mulberry silkgoods certified for exports amounted to 144.87 lakh sq. mtrs. valued at Rs. 30499.24 lakh compared with 178.75 lakh sq. mtrs. valued at Rs. 31816.89

lakh during the corresponding period of 1996-97. It showed a decrease of 4.1% in value. Out of the total natural silkgoods certified for exports, the share of mulberry silkgoods roughly amounted to 98% both in quantity and value.

Countrywise data of mulberry silkgoods certified for exports is given in Table - III.

### Varietywise mulberry silkgoods

During April to August '97 period of the year 1997-98, among the various varieties of mulberry silkgoods certified for exports, dress materials ranked first followed by readymade garments, carpets, sarees and scarves/stoles. Data of varietywise mulberry silkgoods certified for exports are given in Table - I.

### Tasar silkgoods

During August '97, tasar silkgoods certified for exports amounted to 0.53 lakh sq.mtrs. valued at Rs. 85.32 lakh compared with 0.86 lakh sq.mtrs. valued at Rs. 131.47 lakh during August '96.

During April to August '97 period of the year 1997-98, a total quantity of 3.18 lakh sq. mtrs. of tasar silkgoods valued at

**Table - III**  
**Foreign Exchange Earnings from Mulberry Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	August		%	April to August		%	Country Share Percentage in	
	1997	1996		1997	1996		1997	1996
U.S.A.	2556.92	3338.42	-23.4	10652.12	11739.79	-9.3	34.9	36.9
Germany	750.69	876.71	-14.4	4487.19	4457.28	0.7	14.7	14.0
U. K.	556.61	783.16	-28.9	3241.22	3537.92	-8.4	10.6	11.1
France	206.10	283.96	-27.4	1233.94	1129.81	9.2	4.0	3.6
Canada	194.83	285.75	-31.8	1089.23	1146.43	-5.0	3.6	3.6
U.A.E.	169.68	219.87	-22.8	1026.98	908.28	13.1	3.4	2.9
Singapore	326.07	394.40	-17.3	882.05	847.51	4.1	2.9	2.7
Italy	182.38	101.04	80.5	878.34	752.92	16.7	2.9	2.4
Hong Kong	196.89	141.14	39.5	780.84	594.87	31.3	2.6	1.9
Netherlands	122.83	198.11	-38.0	658.06	732.59	-10.2	2.2	2.3
Denmark	122.02	68.88	77.1	482.62	318.83	51.4	1.6	1.0
Australia	64.72	192.34	-66.4	442.30	609.92	-27.5	1.5	1.9
Switzerland	51.11	106.45	-52.0	330.65	415.90	-20.5	1.1	1.3
Malaysia	126.29	67.64	86.7	304.60	217.57	40.0	1.0	0.7
Spain	54.27	58.76	-7.6	277.52	331.67	-16.3	0.9	1.0
Mauritius	75.50	27.85	171.1	251.98	165.88	51.9	0.8	0.5
Japan	119.47	89.17	34.0	246.66	254.57	-3.1	0.8	0.8
Portugal	28.88	33.23	-13.1	242.15	241.11	0.4	0.8	0.8
Austria	38.44	58.09	-33.8	222.95	258.33	-13.7	0.7	0.8
Belgium	37.60	57.12	-34.2	221.53	320.20	-30.8	0.7	1.0
Others	555.73	923.99	-39.9	2546.31	2835.51	-10.2	8.3	8.9
Total	6537.03	8306.08	-21.3	30499.24	31816.89	-4.1	100.0	100.0

@ Refers to top 20 importing countries

**Table - IV**  
**Foreign Exchange Earnings from Tasar Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	August		%	April to August		%	Country Share Percentage in	
	1997	1996		1997	1996		1997	1996
Germany	5.06	32.07	-84.2	78.86	144.40	-45.4	15.8	19.2
U.S.A.	12.24	22.88	-46.5	75.90	173.69	-56.3	15.2	23.1
U.A.E.	22.10	15.74	40.4	54.78	87.86	-37.7	11.0	11.7
Hong Kong	5.07	1.61	214.9	39.98	3.66	992.3	8.0	0.5
France	12.78	7.71	65.8	33.84	27.28	24.0	6.8	3.6
Brazil	2.32	5.10	-54.5	25.17	13.30	89.2	5.0	1.8
Japan	3.07	6.39	-52.0	24.71	31.84	-22.4	4.9	4.2
Italy	1.96	2.27	-13.7	19.96	22.07	-9.6	4.0	2.9
Turkey	0.20	0.08	163.2	15.08	2.46	513.0	3.0	0.3
U.K.	1.04	7.84	-86.7	11.88	51.30	-76.8	2.4	6.8
Belgium	1.69	0.00	-	11.73	2.81	3117.4	2.3	0.4
Saudi Arabia	-	-	-	11.33	4.19	170.4	2.3	0.6
South Africa	1.37	0.00	-	11.20	5.58	100.7	2.2	0.7
Spain	0.46	2.22	-79.3	10.26	11.27	-9.0	2.1	1.5
Colombia	-	-	-	9.59	-	-	1.9	0.0
Canada	1.64	4.34	-62.2	6.84	25.67	-73.4	1.4	3.4
Chile	-	-	-	6.84	4.29	59.4	1.4	0.6
Yugoslavia	4.72	0.96	391.7	6.21	9.13	-32.0	1.2	1.2
Afghanistan	1.50	0.44	240.9	5.92	2.10	181.9	1.2	0.3
Australia	-	2.25	-100.0	5.48	12.32	-55.5	1.1	1.6
Others	8.10	19.57	-58.6	33.78	115.11	-70.7	6.8	15.3
Total	85.32	131.47	-35.1	499.34	750.33	-33.5	100.0	100.0

@ Refers to top 20 importing countries

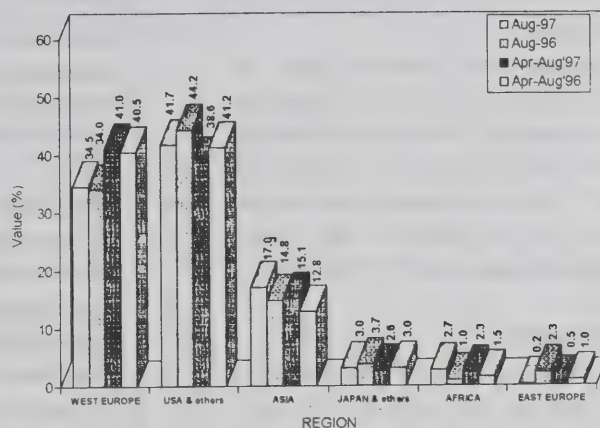
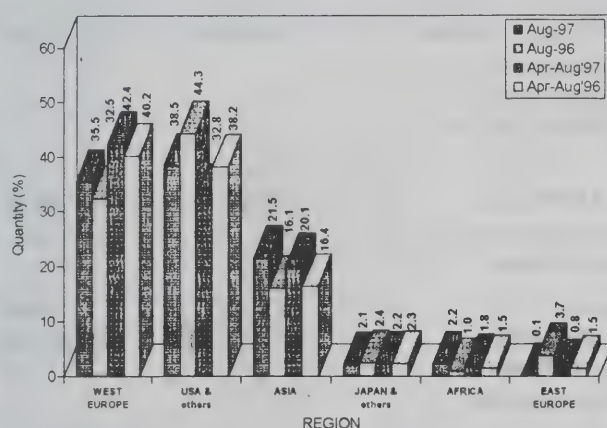


**Table V**  
**Unit Export Price**

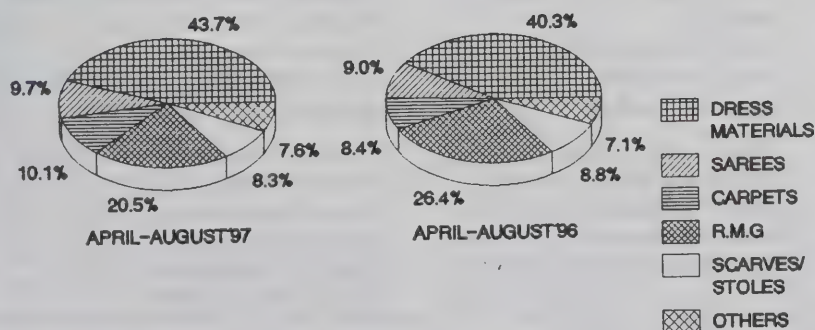
(Rs. per Sq.mtr.)

Item	August			April-August		
	1997	1996	% Increase	1997	1996	% Increase
A. Mulberry Silkgoods						
1. Excl. Carpets	193.40	166.76	16.0	189.63	163.39	16.1
2. Incl. Carpets	210.43	179.66	17.1	210.52	178.00	18.3
3. Carpets	8062.67	6248.55	29.0	9028.83	7526.22	20.0
B. Tasar Silkgoods	161.02	152.17	5.8	157.11	173.45	-9.4

### REGION-WISE SILKGOODS CERTIFIED FOR EXPORTS



### Share percentage of Varietywise Mulberry Silkgoods Export Earnings



Rs. 499.34 lakh was certified for exports as against 4.32 lakh sq. mtrs. valued at Rs. 750.33 lakh during the corresponding period of previous year.

Countrywise data of tasar silkgoods certified for exports are given in Table-IV.

#### Unit export price

The unit export price realised for mulberry and tasar silkgoods during August '97 and April to August '97 period of the year 1997-98 alongwith comparative data of previous year are given in Table-V.

#### Mixed or blended silkgoods

During August '97, mixed/blended silkgoods certified for

exports amounted to 2.49 lakh sq.mtrs. valued at Rs. 360.04 lakh compared with 1.93 lakh sq. mtrs. valued at Rs. 185.41 lakh during August '96 and showed an increase of 94.2% in value.

Mixed/blended silkgoods certified for exports during April to August '97 period of the year 1997-98 amounted to 9.92 lakh sq. mtrs. valued at Rs. 1378.82 lakh compared with 9.32 lakh sq. mtrs. valued at Rs. 920.84 lakh in the corresponding period of previous year and reflected an increase of 49.7% in value.

### Silkyarn

About three tons of spun silk yarn valued at Rs. 33.31 lakh has been certified for exports during April to August '97 period of 1997-98 as against 4 tons valued at Rs. 42.48 lakh in the corresponding period of 1996-97.

### Silkwaste

Silkwaste and its bye-products certified for exports during April to August '97 period of the year 1997-98 amounted to 221 tons valued at Rs. 379.34 lakh as against 4 tons valued at Rs. 5.98 lakh in the corresponding period of previous year.

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2.	<b>Manual on Silkworm Egg Production</b> (Comprehensive book on scientific techniques of production of quality and disease free silkworm eggs. Useful guide for new graneurs and sericulture students)	English	40.00
3.	<b>Hand Book of Muga Culture</b> (Introductory booklet with detailed information on the golden yellow "Muga Silk" of Assam)	English	10.00
4.	<b>Ericulture in India</b> (A useful dossier on the wild silk, eri and its culture)	English	10.00
5.	<b>CSR &amp; TI (Mysore) Bulletins on improved practices of sericulture</b> a. Mulberry Cultivation in South India b. New Technology of Silkworm Rearing c. Improved Methods of Rearing Young Age (Chawki) Silkworms  [Simple and descriptive bulletin with practical tips. Highly useful for new sericulturist.]	Hindi	9.00 (per set)
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# Silk Prices

August 1997

## Raw Silk : Volume of Transaction

At all the silk exchanges in Karnataka, a total quantity of 124.631 tons of all qualities of raw silk valued at Rs.1243.330 lakh was transacted during the month of August '97 as against a quantity of 189.664 tons valued

Bangalore Silk Exchange alone accounted for 79.2% and 75% in both quantity and value, respectively.

During the first five months period of the year 1997-98 (i.e., April to August '97) at Bangalore Silk Exchange, a total quantity of 612.599 tons of all qualities of raw silk valued at Rs. 5892.728 lakh was transacted. The volume of trade

at Bangalore Silk Exchange during the period April to August '97 accounted for 81.3% in quantity and 77.8% in value of the total transaction in all silk exchanges of the State.

Data on qualitywise transaction of raw silk at Bangalore Silk Exchange *vis-a-vis* at all the silk exchanges in Karnataka during August '97, August '96, April '97 to

**Table I. Transaction of Raw Silk at Bangalore Silk Exchange**

Raw Silk Quality	(Qty. : Tonnes, Value : Lakh Rs.)							
	August '97		August '96		April '97 - August '97		April '96 - August '96	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Filature/ Cottage Basin	16.569 (32.195)	212.566 (414.392)	27.669 (63.261)	372.907 (839.452)	106.065 (192.789)	1346.151 (2451.176)	109.657 (209.313)	1444.411 (2723.019)
Charka	55.792 (64.799)	585.071 (684.398)	73.650 (96.252)	830.538 (1085.219)	374.521 (425.438)	3784.116 (4333.213)	332.483 (402.525)	3599.629 (4376.461)
Dupion	26.345 (27.637)	135.187 (144.540)	29.915 (30.151)	168.585 (169.940)	132.013 (135.126)	762.461 (786.321)	108.874 (109.234)	675.432 (677.596)
Total	98.706 (124.631)	932.824 (1243.330)	131.234 (189.664)	1372.03 (2094.611)	612.599 (753.353)	5892.728 (7570.710)	551.014 (721.072)	5719.472 (7777.076)

+ Figures in bracket refer to total transaction at all the Silk Exchanges in Karnataka.

at Rs. 2094.611 lakh during August '96. During the first five months of the year of 1997-98 (i.e., April to August '97), at all the silk exchanges in Karnataka, a total quantity of 753.353 tons valued at Rs. 7570.710 lakh was transacted as against 721.072 tons valued at Rs. 7777.076 lakh of the preceding year.

## Bangalore Silk Exchange

At Bangalore Silk Exchange, which is the largest exchange in Karnataka, a total quantity of 98.706 tons of all qualities of raw silk *viz.*, filature/cottage basin, charka and dupion, valued at Rs. 932.824 lakh was transacted during August '97 as compared to 131.234 tons valued at Rs. 1372.030 lakh during August '96. Of the total transaction in the State, the volume of transaction at

**Table II. Transaction of raw silk of different quantities at Bangalore Silk Exchange during August '97**

Denier	Quality	Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
				Min.	Max.	Avg.
Filature Rawsilk						
13/15	Fine	96	127860	1320	1350	1332
14/16	Fine	1342	1750645	1250	1350	1305
16/18	Fine	4106	5236128	1200	1400	1275
18/20	Medium	3970	5032243	1015	1450	1268
20/22	Medium	3429	4407132	1025	1400	1285
22/24	Medium	216	253691	1150	1200	1174
24/26	Medium	677	811267	1140	1400	1198
26/28	Coarse	1848	2547487	1090	1500	1379
28/30	Coarse	322	391301	1120	1320	1215
30/32	Coarse	563	698846	1100	1450	1241
	Total	16569	21256600	1000	1500	1283
Charka Raw silk						
	Coarse	1457	1049869	608	905	721
	Medium	10372	9416265	700	1000	908
	Fine	43963	48040966	900	1300	1093
	Total	55792	58507100	608	1300	1049

**Table III. Prices of Indigenous Silk**

		(Rs./Kg)					
Silk Exchange	Variety	August '97			August '96		
		Min	Max	Avg	Min	Max	Avg
Bangalore Silk Exchange (Karnataka)	Filature/Cottage Basin	1015	1500	1288	600	1550	1348
	Charka	608	1300	1049	360	1360	1128
	Dupion	185	810	513	151	850	564
Anna Silk Exchange, Kanchipuram Market (Tamil Nadu)	Filature/Cottage Basin	700	1265	1203	1185	1410	1303
	Charka	820	930	892	875	1030	975

**Imported Silk (Varanasi Market)**

		(Rs./Kg)			
Filature Silk 20/22 Dr	August '97		August '96		
	Min	Max	Min	Max	
Chinese	1500	1660	1200	1350	
Korean	-	-	1175	1300	

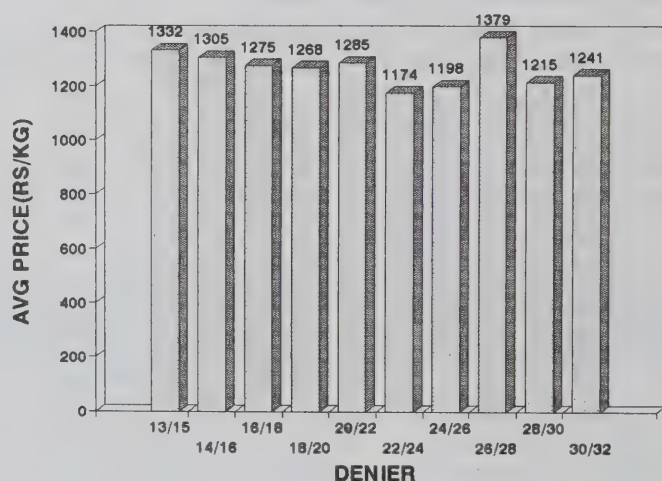
August '97 and April '96 to August '96 are given in Table-I. The transaction of different deniers of filature, cottage basin and charka raw silk at Bangalore Silk Exchange during August '97 is given in Table-II.

### Prices of Sericultural Commodities

The prices of different qualities of indigenous raw silk ruled at Bangalore Silk Exchange (Karnataka) and Anna Silk Exchange (Tamil Nadu) in addition to prices of imported raw silk at Varanasi market during August '97 in comparison with August '96 are given in Table - III.

The prices of different varieties of mulberry reeling cocoons quoted at important cocoon markets of southern states viz., Karnataka, Tamil Nadu and Andhra Pradesh are given in Table IV.

**Average Prices of Denierwise Filature Raw Silk Transacted at Bangalore Silk Exchange**



**Table IV. Mulberry Reeling Cocoon Prices**

		(Rs/kg.)				
State	Market	Variety	August '97		August '96	
			Min	Max	Min	Max
Karnataka	Ramanagaram	Imp. cross breed	80	167	70	168
	T. Narasipur	Ord. cross breed	33	85	30	91
Tamil Nadu	Vaniyambadi	Imp. cross breed	40	123	60	128
	Coimbatore	Imp. cross breed	60	138	90	147
Andhra Pradesh	Hyderabad	Multivoltine	30	119	43	105
	Dharmavaram	Multivoltine	50	133	41	139

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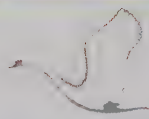
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# Novel Scheme to Boost Quality

**A**s we discussed in this very column earlier, the demand for high quality raw silk is on the increase in the recent years. A rough estimate puts the demand at six to seven thousand tons a year, especially from the powerloom sector.

The research institutes on the other hand, are attempting to release new silkworm races with higher silk content, to increase the silk production and productivity. New races like CSR series demand improved reeling techniques for better results. These factors indicate the need for upgradation of our reeling techniques and infrastructure.

For long, development of the reeling sector had not been an easy task, for several reasons, notwithstanding its amazing ability to perform better amidst oddities and to generate gainful employment. Factors like poor infrastructure, need for huge working capital, inadequate technical, financial and marketing support, strong and hard-to-break traditional practices were not much conducive for the development of a taste for quality and competitive spirit. Yet, we need to excel.

Thanks to the concerted R & D efforts of various developmental agencies, in the last few years, the industry witnessed introduction of several advanced reeling and auxiliary devices that could produce quality raw silk. The latest is the multi-end reeling technology package evolved by the Central Silk Technological

Research Institute of the Central Silk Board which could produce graded quality raw silk suitable for powerloom warp, using locally available cocoons. Once adopted widely, it would help reduce our dependence on imported raw silk.

However, such technology upgradation calls for high investment by the reelers and the paucity of funds often becomes an obstacle. The new subsidy-cum-loan scheme introduced by the Government of India, through Central Silk Board is an earnest attempt in this direction to ease the problems of the reelers. The scheme envisages establishment of 300 multi-end reeling units of six to ten basins in the first phase spread over three years. The scheme would emphasise mainly the upgradation of existing cottage basins besides promotion of 20 % new units. Open to all the states, the scheme, offers 30% subsidy equally shared by the centre and the state, while the entrepreneur has to contribute 10 % of the total investment, initially. The Central Silk Board advances the rest 60 %, interest free, which has to be repaid in a span of ten years, from second year onwards.

Here is an excellent opportunity for our reeling community not only to upgrade the technology for better silk (and earnings, of course), but also to come out of the traditional image of a mere 'converter'.

 **Editor**

## Credibility of Survey Reports on Sericulture Economics

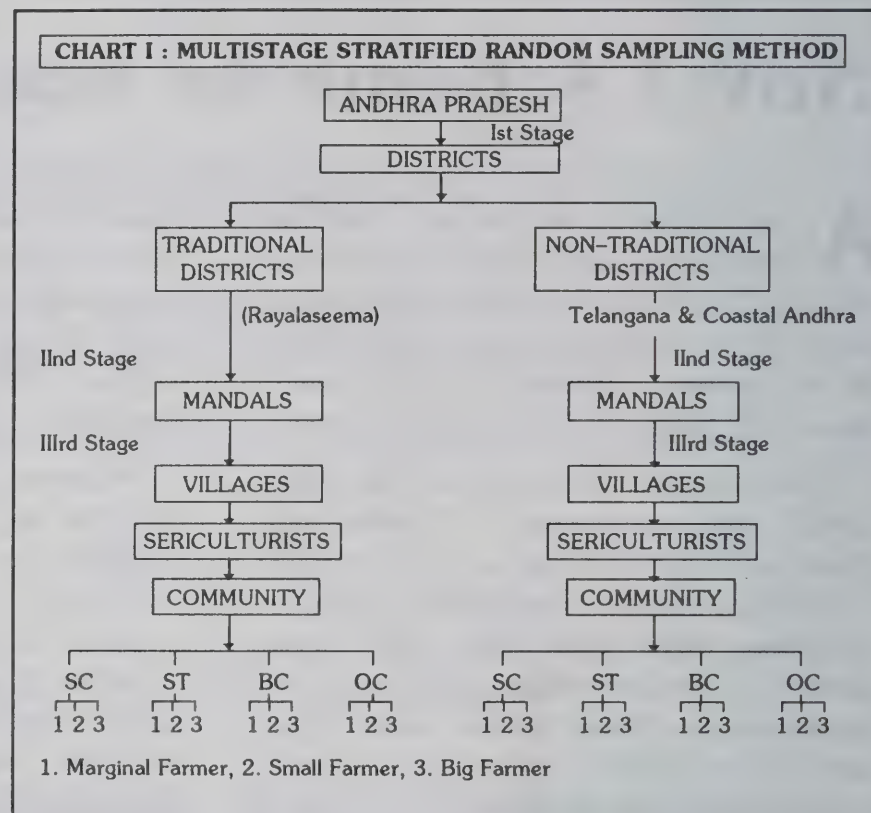
This is with reference to the article "Economics of Sericulture: An Update" by S. Lakshmanan *et al.* (*Indian Silk*, May, 1997). Before conducting a survey with an objective of estimating cost and income in Karnataka, Andhra Pradesh, Tamil Nadu and Kerala, the authors should have followed the methodology for stagewise sampling in selection of the sericulturists for collection of the primary data on the subject of study/ importance taking the following into consideration :

**Data collection :** The authors have covered large geographical area in the four states of South India and collected data from a sample of 750 households on the economics of sericulture through multistage stratified random sampling. The heterogeneity considerably present in the sericulturist population with regard to their socio-economic status should have been taken into view as well, a random selection of certain number of sampling units from each stratum be made to ensure their suitable representation. Further, the multistage sampling procedure adopted does not indicate different stages of investigation.

A Multistage Stratified Random Sampling Method for Andhra Pradesh is given in the Chart I.

## Major Findings

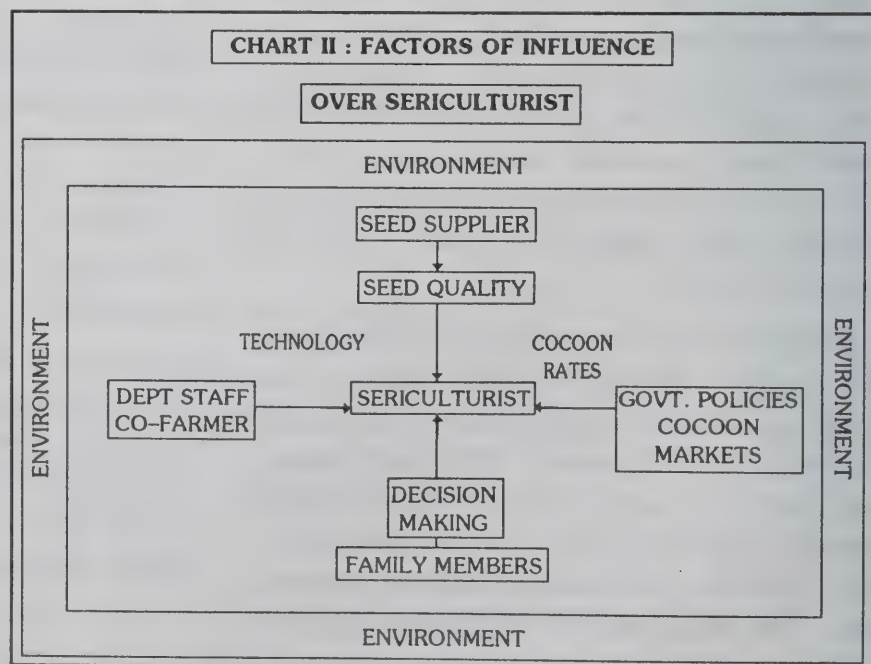
**Mulberry leaf production :** The data lacks authenticity as far as Andhra Pradesh is concerned, since in most of the areas, the farmers use the mulberry shoots with leaves for feeding, cut by a scissor. Of late, shoot rearing method has also gained momen-



tum in traditional/non-traditional areas, hence, maintaining a record of leaf production is not possible. Further, there was no mention about the mulberry varieties (*i.e.*, local, M5 or improved series) to

get different levels of production.

**Cost of leaf production :** The reasons for higher cost of leaf production were not given, such as, difference in type of soil and variety and managerial practice.





**Cost of cocoon production :** Variation in leaf production and cocoon production from year to year is due to various climatic factors and management by the rearers. Also, no point is mentioned on the above factors with regard to the different categories of the farmers' community.

**Cocoon yield :** The cocoon yield of the farmers would always vary in different zones not because of various factors only but mainly due to the usage of CB/hybrid improved layings of different racial combinations. No. of eggs/100 dfls. and hatching percentage, leaf quality, rearing management and congenial climate also play a role.

**Returns :** The returns i.e., net income depends on the cocoon prices prevailing in different states. In a state with well-established reeling sector, the rearers would get a fair price than elsewhere. For example, sericulturists of coastal Andhra Pradesh areas like Vijayawada and Guntur have to incur on transportation to Government Cocoon Market of Rayalaseema or to distant places

like Ramanagaram of Karnataka in order to get higher prices than the rates prevailing in local markets. So, variation in net returns among farmers of different areas of any state is inevitable.

When an economic survey is made, the net income on sericulture should be compared though referred in the article also, with the returns of other cash crops in the respective states but it presents a mere comparison of the data recorded in different states. A crop most economic in one area, is unsuitable for another area of the same state. In Andhra Pradesh, the raising of mulberry plantation suited well to traditional Rayalaseema area with limited irrigation facilities is not that much practised/economic in Telangana and coastal Andhra Pradesh because of well developed irrigation system where paddy is raised to a larger extent. It is also due to demand of labour for garden and rearing management.

The increased cost of production and crop loss, reported to be due to various diseases not minimised by the farmer has to be

looked into since the farmer cannot minimise and prevent/control the different forces of influence. The factors of influence are controlled by the surrounding environment (Chart-II).

It is well said by the authors that sericulture economics differs from state to state and even region to region in a state. This itself poses a question on the credibility of this survey with regard to facts and figures recorded and their use in interpretation of data in the formulation of a project/report for the development of sericulture industry in India. The survey could have been rightly planned with research methodology instead of carrying it out with academic purpose. The survey report based on the collected primary data should always become the basis for a secondary data for other researchers for preparation of programmes/projects in sericulture development.

**Dr. C. Raja Gopal Reddy**  
Inspector(s)

Department of Sericulture,  
Govt. of Andhra Pradesh,  
Anantapur (A.P.)

### **For the readers, please !**

This refers to the article, "Why not Loose Silkworm Eggs" by N.M. Biram Saheb and M.V. Samson (**Indian Silk**, August, 1997). It has been observed that the contents of this article and another article "Losse Egg - Production Technology" by the first author (January, 1996) is same.

The article published in August, 1997 states that "the heavier and lighter eggs which are considered inferior for rearing are eliminated through winnowing or by salt solution method". If any such technology has been developed for separating heavier eggs,

it may be elaborated in the interests of the readers, as only unfertilized and dead eggs are eliminated in preparation of loose eggs.

**S.B. Saraswat**  
Deputy Director

Purvanchal Sericulture  
Development Project,  
Central Silk Board, Varanasi.

*(The two articles published in Jan. 1996 and August, 1997 are though on the same subject "loose eggs", the first one details the technology of the production while the latter is an effort to educate the farmers and producers about the advantages of the use of loose eggs, removing their apprehensions.*

*- Editor.)*

### **Milestones of Success**

This refers to the article "Magic of Silk" by Arun Ramanathan (**Indian Silk**, August, 1997). The progress of Indian silk industry and achievements made in the vertical production of sericulture by developing improved breeds, technology, packages, machineries, process etc. is noteworthy, indeed.

**Dr. A.B. Singh**  
New Delhi

**Please make your letters brief and to the point. Send your letters to the Editor, with your complete postal address.**

# Management Information System in Germplasm Maintenance

S. Sekhar, A.K. Goel, P. Mukherjee and K. Thangavelu

---

***'Management Information System' has a prime place in the conservation of genetic resources, which has assumed greater significance world-wide in the context of dwindling natural resources owing to degradation in the environmental factors. The information can be useful, meaningful and economical when it is properly analysed and logically organised to make it user-friendly, easily available and retrievable. The article focuses on the relevance and adoption of 'Management Information System' in the Silkworm and Mulberry Germplasm Station.***

---

**G**enetic resources provide the most valuable base to the breeders and scientists to develop high yielding varieties and cultivars. In the changing environmental scenario, the natural variability and gene pool are narrowing down due to depletion of forest wealth, industrialisation, urbanisation, expanding agriculture and replacement of low yielding land races with the high yielding monocultures. Therefore, the prime factor in conservation is to maintain the whole spectrum of genetic variability.

The germplasm maintenance can be useful, meaningful and economically viable only when it is utilised widely on a continuous basis. However, conservation of genetic resources alone, cannot serve the purpose until the necessary information base is developed. The practical utilisation of the germplasm resources squarely depends on the information provided on the conserved material to the breeders, so that they can select the desirable genotypes required for any specific breeding programmes.

In India, various sericultural research institutes/stations/universities/state farms generate huge amount of data while working on different experiments, projects and developmental schemes. Most of the time it leads to redundancy in the absence of a scientific system to develop database. The breeders and other scientists are working

on different aspects of improvement but the availability of comprehensive and valid information system is still lacking and even sometimes the precious breeding material is lost. Thus, the manpower engaged and the other valuable resources put to use do not yield the desired result in the absence of a well-planned, systematic, collective, and co-operative approach-link to National Information System in sericulture research. Recently, effort has been made by Central Silk Board to develop a Management Information System (MIS) with a wide network covering almost the entire aspects of research development.

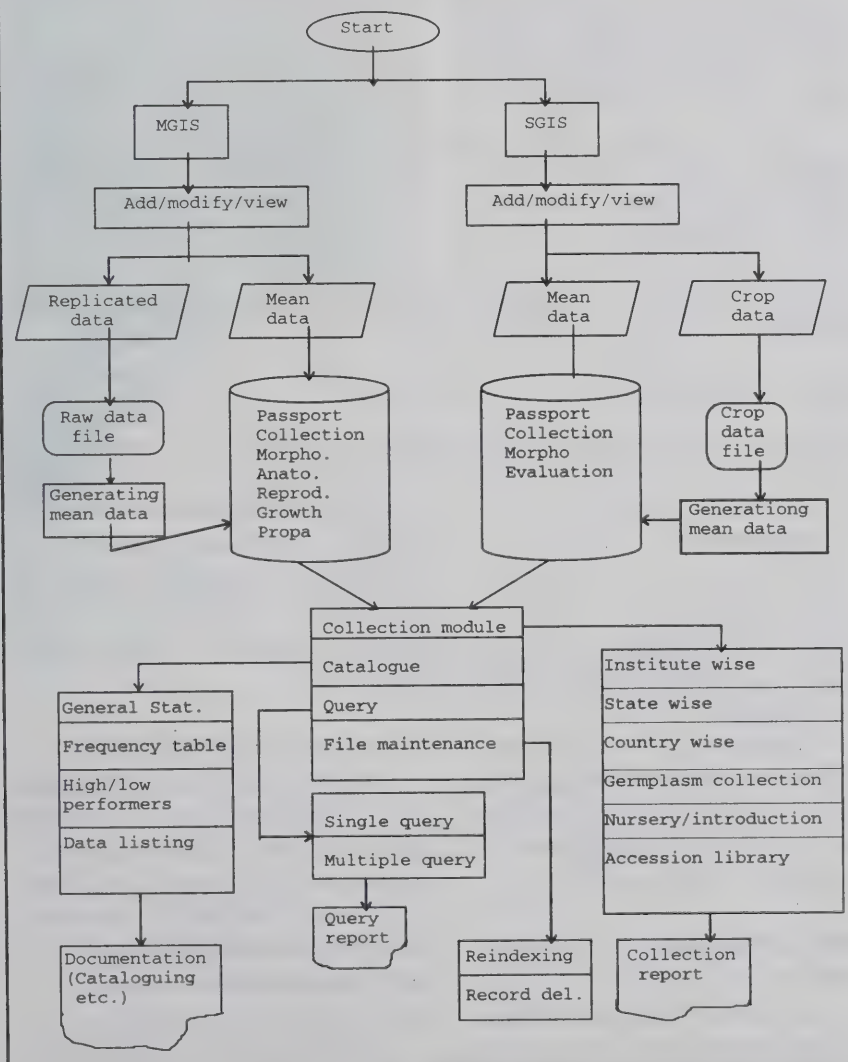
In agriculture, National Bureau of Plant Genetic Resources (NBPGR), New Delhi, with its 30 active sites is engaged in maintenance of more than 1,50,000 germplasm accessions of different crops. It has collaboration with National Research Centres (NRC), All India Co-ordinated Crop Improvement Programme (AICCIP), Agriculture Universities, Department of Environment and Forest besides linkages with international organisations particularly, International Plant Genetic Resources Institute (IPGRI), International Rice Research Institute (IRRI), International Crops Research Institute for Semi-Arid Tropics (ICRISAT), International Maize and Wheat Improvement Centre, Mexico (CIMMYT). Some of the package like Germplasm Resources



**Table 1. All accessions having protein %  $\geq 6$  and stomatal frequency  $\leq 800$ , leaf yield/plant  $\geq 1.1$  kg, 100 leaf wt  $\geq 300$  gm, leaf surface=smooth, leaf area  $\geq 175$  sq.cm, leaf colour=deep green, carbohydrate (dry).=8, survival % $>60$  and moisture content % $\geq 65$ .**

ACC-No	Protein (Dry)	Stomata Freq.	Leaf Yield	100 leaf Weight	Leaf Surface	Leaf Area	Leaf Color	Carbo. % (Dry)	Survival %	MC%
ME-0006	11.7630	592.000	1.52	786.33	Smooth	561.00	Deep green	10.2496	82.237	66.22
ME-0058	20.0946	584.000	2.07	322.57	Smooth	274.67	Deep green	9.4681	85.000	70.66
MI-0008	22.1312	350.000	1.32	304.03	Smooth	253.33	Deep green	14.7394	70.000	67.37
MI-0009	16.0522	446.000	1.25	545.37	Smooth	361.00	Deep green	13.2530	70.000	66.89
MI-0066	22.1929	677.000	1.50	372.21	Smooth	281.00	Deep green	13.4982	69.342	69.29
MI-0099	12.5036	729.000	1.23	306.17	Smooth	248.67	Deep green	12.1191	71.053	68.67
MI-0139	10.9299	617.000	1.86	417.83	Smooth	375.67	Deep green	10.3569	73.684	70.83
MI-0173	8.4613	516.000	1.29	438.13	Smooth	413.67	Deep green	12.0884	92.500	72.33
MI-0188	7.7207	549.000	1.61	400.00	Smooth	303.67	Deep green	8.1350	75.000	69.55
MI-0191	9.7882	771.000	1.32	362.15	Smooth	311.67	Deep green	11.3836	64.412	68.74
MI-0199	8.8933	566.000	1.12	313.81	Smooth	250.00	Deep green	12.5482	63.572	67.27

#### DATA FLOW DIAGRAM (DFD) AND FACILITIES OF MGIS AND SGIS



Information Network (GRIN), Germplasm Evaluation Information System (GEIS), Genetic Resources Information Package (GRIP) are in use in the germplasm maintenance. Further, at the international level, development of a global database, World Information and Early Warning Systems (VIEWS by FAO, is in progress to provide information on the plant genetic resources and technologies pertaining to 190 countries. It is also intended to alert the international community on hazards threatening the loss of *ex-situ* and *in-situ* plant genetic resources for food and agriculture. Even then, much of the world's *ex-situ* plant genetic resources are not well documented.

In sericulture, the germplasm is maintained at separate stations in developed countries, whereas in India few accessions are still being maintained at different research institutes located under agro-climatic conditions. This may be one of the reasons why an information system, in sericulture and particularly in germplasm maintenance, is lacking in the country. During 1991, Silkworm and Mulberry Germplasm Station (SMGS) was

**Table 2. All accessions having facundity  $\geq 500$ , cocoon wt.  $\geq 1.2$  g, shell wt.  $\geq 0.20$  g, shell ratio  $\geq 17\%$ , pupation rate  $\geq 80\%$ , yield/10000 larvae by no.  $\geq 8000$ , yield/10000 larvae by wt.  $\geq 10$  kg, Filament length  $\geq 800$  m, Denier  $\geq 1.5$  and cocoon shape=Oval.**

ACC-No	FEC	CWT	SWT	SR%	P/R	ERR No.	ERR WT	F/L	Denier	C. Shape
BBE-0014	547	1.722	0.297	17.399	90.08	9095	18.82	859	2.691	Oval
BBE-0043	536	1.783	0.310	17.565	85.31	8683	18.51	889	2.826	Oval
BBI-0047	540	1.505	0.286	18.878	82.34	8358	15.63	846	2.747	Oval
BBI-0072	524	1.692	0.316	18.765	82.17	8467	15.03	1029	2.363	Oval
BBI-0084	506	1.597	0.289	18.102	84.55	8617	16.96	1018	2.717	Oval
BBI-0136	524	1.478	0.287	19.304	86.58	8833	16.44	857	2.306	Oval
BBI-0137	520	1.617	0.278	17.249	87.23	8708	15.96	907	2.703	Oval
BBI-0138	532	1.610	0.322	20.161	80.66	8321	14.61	1051	2.231	Oval

established as the nodal centre for collection and maintenance of genetic resources. In China and Japan, germplasm centres were established more than 40-50 years back and developed systematic data.

### Germplasm maintenance

Usually, the following activities are carried out by a germplasm station in order of priority.

- Survey, exploration and collection of genetic resources from in-situ and ex-situ sources.
- Characterisation of collected resources.
- Evaluation of collected resources.
- Classification of resources.
- Documentation (Cataloguing etc.)
- Exchange of information and genetic material.
- Conservation of genetic resources.

### Area of information

The activities of a germplasm station are multifarious, not only generation but also collection of data from various sources and maintenance of the same in such a manner so as to facilitate their easy retrieval. A few areas of information essential for germplasm maintenance are :

**Passport data :** Comprising genetic origin, scientific and ver-

nacular names, distribution donor, etc.

**Collection data :** Containing latitude, longitude, altitude, herbarium specimen, data of collection, source and other related data.

**Characterisation :** Consisting of morphological, cytological, anatomical, reproductive, bio-chemical and biomolecular parameters.

**Evaluation data :** Containing survival, rooting, growth, development, yield and its contributing characters at various stages, covering one or more number of locations, seasons and years. Evaluation is a continuous process and as such there is a regular data flow. Hot spot evaluation for specific parameter is essential for identification of suitable germplasm for breeding programme.

**Conservation :** Consisting of accession conserved, location of availability, material for multiplication and its status for supply besides the technology adopted in maintenance.

It is important that the areas of information are not unnecessarily repeated. A minimum list of descriptors for the management of gene bank is suggested.

### Data generation and maintenance

In order to improve the sericultural scenario in the country,

both mulberry and silkworm germplasm first need to be assembled at Germplasm Station (SMGS) and thereafter look for the world collection that is presently to the tune of 3500 silkworm and 7000 mulberry accessions, though 50% of these resources is of duplication either being maintained by the same name or different accession numbers. Presently, SMGS has collected 770 mulberry and 225 silkworm accessions after eliminating the duplicates for characterisation and evaluation. Data on more than 100 varieties in mulberry and 70 in silkworm are being recorded besides the voluminous passport and site collection information. The station is also making efforts to collect and maintain the data generated in various research institutes and universities to develop a National Repository of germplasm leading to a National Documentation Centre.

### Information management

Information serves as the basis for all activities and its proper synthesis and logical organisation is known as 'information management'. Flexibility, reliability, integrity and easy retrieval make an information system more useful than simple documentation.

A sound information system



should have the following characteristics:

- Easy data input.
- Flexible data storage and retrieval.
- Data validation during input phase.
- Availability of secondary information, storage and retrieval facilities.
- Availability of data for multiple analysis and use.
- Exchange of information.
- Simple and user-friendly.

### Information system

Realising the importance of systematic data and information maintenance on long term perspective, SMGS (Informatics Division) has developed two information systems namely, Mulberry Germplasm Information System (MGIS) and Silkworm Germplasm Information System (SGIS) incorporating various facilities for data storage, alongwith retrieval facilities (see flow chart). The information systems were developed by

using Clipper (ver. 5.01) language. While developing the systems, the standard packages in use at NBPGR and CIMMYT were taken into account to make the package more user-friendly.

### Facilities at MGIS and SGIS

In order to make MGIS and SGIS more meaningful and user-friendly, the standard data format in terms of terminology and measurement has been used for all the types. In both the systems, integrated database techniques were used. User-friendly menu driven facilities have been incorporated for easy data viewing, information retrieval, updation, and report generation. Each file of the integrated database is linked to the accession number which is a unique number assigned to each accession serving as the primary key.

### Query module

The facility for identification and selection of accessions on the basis of certain desirable criteria

upto ten quantitative and/or qualitative characters has been developed as separate module so that scientists will not have any difficulty in operation (Table 1 & 2). The systems are flexible enough to allow modifications and insertion of new modules as per the changing needs of the scientists in future.

Using MGIS and SGIS packages, the SMGS has prepared two catalogues on mulberry (328 accessions) and silkworm (225 accessions) which will be published shortly. It is expected that such documents with relevant information would promote utilisation of germplasm in large scale, besides bringing an awareness on the importance of developing Management Information System for germplasm maintenance.

*The authors are with SMGS Hosur, Tamil Nadu except the second who is with State Sericulture Research and Development Institute, Hindupur, Andhra Pradesh.*

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# Egg Incubation and its Impact on Larval Development

E. Muniraju, B.M. Sekharappa and R. Raghuraman

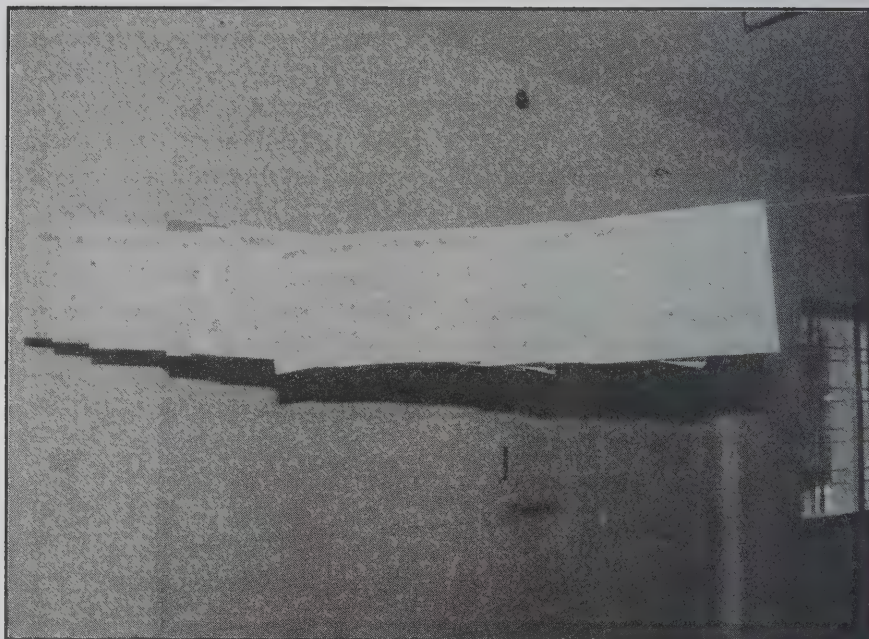
**T**he success of silkworm rearing depends on the quality of food, rearing technology and proper handling. The eggs should be protected from adverse environmental conditions in order to

---

**Optimum environmental conditions such as temperature, humidity and light have a direct bearing on the proper incubation of eggs to get uniform hatching and healthy silkworms. The authors suggest a novel method of incubation which is not only cost effective but also easy to manage. The method has also been evaluated and contrasted with other recommended methods.**

---

get uniform hatching and healthy larvae. During incubation, optimal environmental conditions - temperature (25°C), humidity (80-90%) and light (5 lux) - influence proper growth and development of embryos.



**Fig. 1. Farmers method of egg incubation**

## **Technologies recommended**

Different methods have been suggested to provide the required ideal conditions during egg incubation for tropics. They include -

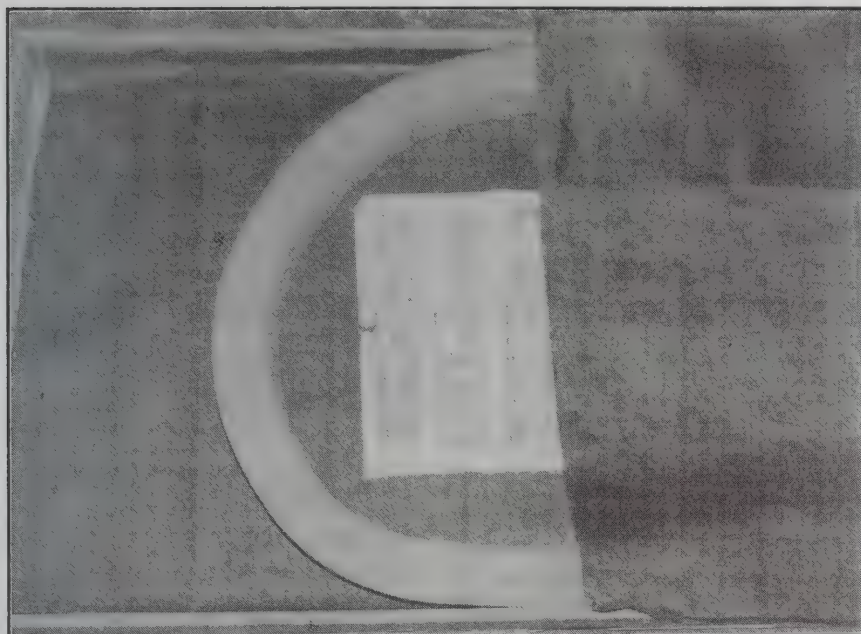
- Tray with wax paper and wet foam pads
- BOD incubator
- Incubation rooms
- Low cost incubation chamber
- Double brick-wall chamber
- Pot on the sand bed
- Controlled incubation chamber.

In the present study, attempts have been made to develop simple and effective approaches to provide the required environment of egg incubation and the same has been evaluated with present recommended incubation methods.

**Farmers methods:** Generally, farmers tie the egg sheets and hang them without making provision for the required environmental conditions (Fig.1). In this method, eggs are directly exposed to wide fluctuations of environment. Under such conditions eggs loose water content leading to impaired development resulting in irregular and poor hatching. Such larvae are generally weak and susceptible to diseases easily.

**Tray method:** Few rearers spread egg sheets in a clean rearing tray over wax paper, surround them with wet foam pad and cover the layings with another sheet of wax paper for ensuring humidity around the eggs (Fig 2). Though





**Fig. 2. Tray method of egg incubation**

this method is better than the farmers method, required optimum environment cannot be assured. The wet foam pad and wax paper are helpful in raising humidity but will not ensure the required temperature regulation.

**Incubation in Isolation chamber:** Layings incubated in a tray inside the "Isolation chamber" developed for chawki rearing provides ideal temperature and humidity (Fig. 3). This method is

better than the indicated incubation methods. There is scope for raising the humidity upto 75-80% when room humidity is as low as 55-60%.

**Buried pot methods :** Earthen pot of 50-litre capacity is placed in sand upto neck. Sand is kept wet by sprinkling water from a day prior to egg incubation upto hatching. Egg sheets are hung closely inside the earthen pot (Fig. 4) without covering the lid upto eye

spot stage. Layings at eye spot stage were wrapped in tissue paper to avoid the loss of hatched larvae.

On the expected (tenth) day of hatching, layings were removed from the pot and exposed to light for uniform hatching. Care has been taken to prevent ants invasion.

### Environmental variation

**Temperature :** From the tables 1 and 2, it is seen that maximum temperature deviation of around 2.5°C is recorded in a day under room conditions and in tray kept outside the chamber. This deviation is less than 0.4°C inside the pot. In addition to minimum fluctuations (Fig. 1), mean temperature recorded is 25.9°C which is 3.1°C less than the room temperature.

**Humidity :** Similar to temperature, a mean humidity of 94.3% with minimum fluctuation (0.3%) has been recorded (Fig. 2 and Table 3) in buried pot which has shown 35% improvement over room condition.

Providing wet foam pads and paraffin paper cover for egg incubation in trays marginally reduces temperature around the eggs due to increased humidity. Earthen pot buried in wet sand has recorded almost ideal temperature suited to egg incubation because of evaporative cooling. Humidity increase is due to wet source, porosity and water holding capacity of the pot. However, the degree of cooling varies with the ambient temperature, humidity, surface to volume ratio exposed and frequency of wetting.

**Hatching :** In the batches incubated inside the buried pot, hatching on tenth day was recorded when exposed to diffused light (400-500 lux) between 8 and 9 a.m. This was advanced by a day

**Table 1. Relavance of different methods of egg incubation**

Environmental Variations								
Treatment	Temperature (°C)				Humidity (%)			
	Mean	Min.	Max.	Diff.	Mean	Min.	Max.	Diff.
Room	28.99	27.93	30.43	2.50	58.88	50.17	71.51	21.34
Tray outside	28.66*	27.64	30.00	2.36	71.26**	59.71	73.29	3.50
Tray inside	28.29**	27.50	29.50	2.00	74.31**	71.71	76.57	4.86
Buried pot	25.90**	25.64	26.00	0.36	94.29**	94.14	94.43	0.29
F Test	HS	—	—	—	HS	—	—	—
CD at 5%	0.29849	—	—	—	1.4938	—	—	—
CD at 1%	0.3929	—	—	—	1.96632	—	—	—
Note : HS - ** = Significant at 1% S - * = Significant 5% NS = Non significant Values compared with room treatment.								

**Table 2. Temperature Variation in Different Methods of Egg Incubation**

(Mean values over 7 days)

Duration (Hrs.)	Temperature (°C)	Temperature Comparisons								
		S 0Hr.	3Hr.	6Hr	9Hr	12Hr	15Hr	18Hr	21Hr	24Hr
0	28.04		**	**	**	**	**	**	**	**
3	27.77			**	**	**	**	**	**	**
6	28.34				**	**	**	**	**	**
9	28.98					**	**	**	**	**
12	28.70						**	**	**	**
15	28.24							**	**	**
18	27.50								—	**
21	27.50									**
24	27.50									—

Note : HS-\*\* = Significant at 1% Values compared with room treatments.

S-\* = Significant at 5%

NS = Non significant

S = 0 Hr. is from 8 A.M.

in respect of other treatments. Hatching of 96.9 and 90.9% (Tables 4 and 5) was recorded for crossbreed and bivoltine layings. Incubation inside the buried pot showing an improvement of 15.5 and 40% respectively over room condition treatment.

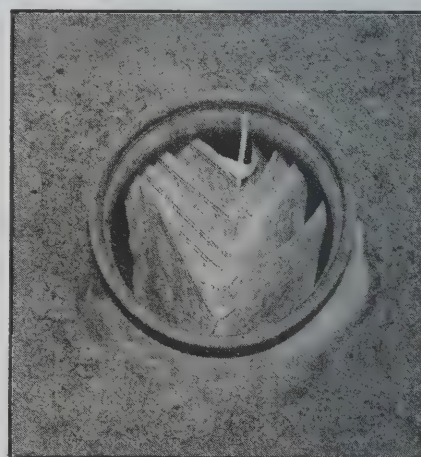
Too dry or too wet air is harmful to the physiology of the

embryos. They have least resistance to driness from E3 (rotation) stage of development upto hatching. Under dry conditions eggs lose water easily, resulting in irregular and poor hatching.

In tropics, the temperature is invariably high and humidity is low with wider fluctuations in a day. Under such conditions, hatching

**Fig. 3. Isolation chamber method**

sets in early as has been observed under farmers method of egg incubation and is of the order of 81.4% and 51.1% for multi-bivoltine and bivoltines, respectively. This clearly indicates the limited tolerance of the bivoltine over multibivoltine. Maximum hatching of 97 and 91% is recorded for multibivoltine and bivoltine respectively at high humidity of 94.3% and low temperature of 25.9°C which are more or less constant resulting in uniform hatching of healthy larvae.

**Fig.4. Pot method of egg incubation****Table 3. Humidity Variation in Different Methods of Egg Incubation**

(Mean values over 7 days)

Duration (Hrs.)	Humidity (%)	Humidity Comparisons								
		S 0Hr.	3Hr.	6Hr	9Hr	12Hr	15Hr	18Hr	21Hr	24Hr
0	75.03		**	**	**	**	**	**	**	**
3	73.93			**	**	**	**	**	**	**
6	74.14				**	**	**	**	**	**
9	72.86					**	**	**	**	**
12	74.44						**	**	**	**
15	74.68							**	**	**
18	76.36								—	**
21	77.71									**
24	78.75									—

Note : HS-\*\* = Significant at 1% Values compared with room treatments.

S-\* = Significant at 5%

NS = Non significant

S = 0 Hr. is from 8 A.M.

**Larval development:** Larvae on hatching under different treatments were reared to study the effect of incubation on further growth and development. Growth achieved in multibivoltine at the end of fifth day (4 mg) is nearly ten-and-a-half-times over the



**Table 4. Relevance of Different Methods of Egg Incubation**

(Mean values over Replications)

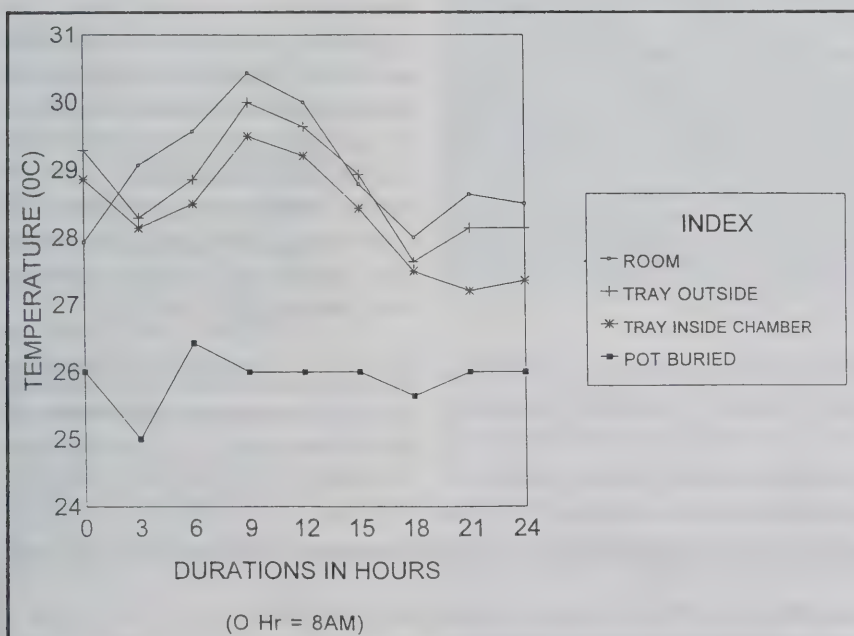
Treatments	Hatching (%)		Larval Weight (gm/100 Larvae)			
	CB	BV	CB		BV	
			Just hatched	Fifth day	Just hatched	Fifth day
Room	81.40	51.10	0.033	0.31	0.039	0.298
Tray outside	93.01**	62.83	0.036**	0.34**	0.041**	0.338**
Tray inside	92.81**	74.09**	0.036**	0.35**	0.042**	0.402**
Burried pot	96.85**	90.94**	0.038**	0.40**	0.042**	0.466**
F Test	HS	HS	HS	HS	HS	HS
CD at 5%	6.0159	14.7277	—	0.01	—	0.01
CD at 1%	8.001	19.5878	—	0.013	—	0.012

Note : HS-\*\* = Significant at 1% Values compared with room treatments.

S-\* = Significant at 5%

NS = Non significant

S = 0 Hr. is from 8 A.M.

**Temperature variations in different methods of egg incubation**

initial recorded weight for the pot incubated treatment. But in the case of eggs incubated in room condition, it was around nine times. Similarly in bivoltine, the growth rate, in the pot incubated eggs is highest (11 times) as compared to treatment under room condition (8 times). From the study, it is clear that incubation method affects not only initial weight but

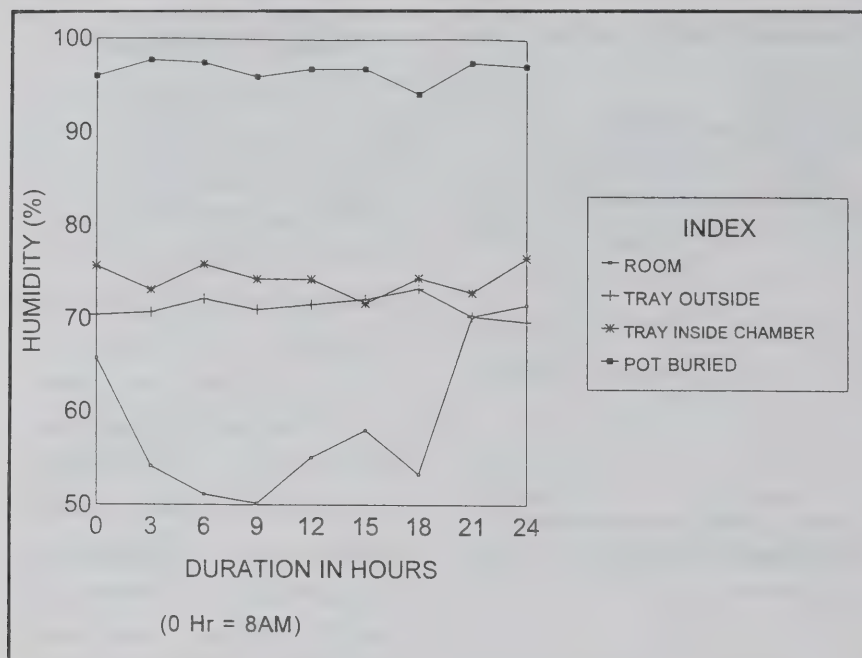
also the growth rate. The correlation co-efficient of temperature and humidity on hatching and larval weight is presented in Table-4. Temperature and humidity together not only influence embryonic duration but also weight. High temperature and low humidity treatment during incubation results in low initial weight of larvae (10.33 mg/larvae) in multi-

## Ideal Method

Incubation can be defined as preservation of silkworm eggs under controlled environmental conditions, so as to suit the silkworm eggs to develop normally and hatch as healthy larvae, with maximum hatchability on the expected day. Incubation has direct influence on the development of embryo, uniformity in hatching, health of the larvae and voltinism, resulting in successful cocoon crop. Ideal practice of incubation is  $25 \pm 1^\circ\text{C}$  temperature, 80% relative humidity and 16 hr. light and 8 hr. dark.

It is always advisable to transport the eggs during early developmental stages i.e. within four days from onset of incubation. Black boxing is done prior to 48 hr. to hatching i.e. when the eggs have reached head pigmentation [pin head] stage. They are wrapped in a black paper or black cloth which helps in obtaining uniform hatching within two hrs. when exposed to light. After black boxing, the eggs are exposed to diffused light to stimulate hatching. The light source should be one meter away from the eggs.

**-Editor**



bivoltine. In bivoltine under optimum condition, the growth is around 11 times as compared to only 8 times under high temperature and low humidity management. Ito and Kabayashi (1978) recommended minimum humidity of 90% throughout incubation for proper growth and development. It is observed that beyond optimum humidity (90%) there is no adverse effect of hatching or initial effect, mainly due to the prevailing constant low temperature of around 26°C (pot buried in wet sand). The temperature and humidity attained in the present approach is favouring good growth and development of embryos during incubation resulting in uniform hatching.

There is significant negative correlation for high temperature and positive correlation for humidity for both growth and hatching. The present approach is cost effective and easy to manage. The rearers in tropics can easily adopt this simple and effective method and harness good results.

*The authors are with Karnataka State Sericulture Research & Development Institute, Thalaghattapura, Bangalore.*

**Table 5. Correlation Coefficient of Different Methods of Egg Incubation**

Treatments	Hatching (%)		Larval Weight (gm/100 Larvae)			
			CB		BV	
	CB	BV	Just hatched	Fifth day	Just hatched	Fifth day
Temperature	-0.7095*	-0.9282*	-0.8311	-0.6368*	-0.9602*	0.9273*
Humidity	0.8639*	0.9765*	0.944*	0.7954*	0.9991*	0.965*
t' Test						
Temperature	-1.55	-1.4185	-0.9564	-1.7216	-1.4154	-1.4186
Humidity	1.67866	1.4535	1.4168	1.46344	1.4143	1.41513

Note : \*Values Significant

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# Management of Spiralling Whitefly

S. Douressamy, N. Chandramohan, N. Sivaprakasam, A. Subramanian  
and P.C. Sundara Babu

**M**ulberry crop, *Morus alba* L. is affected by a number of sucking pests like scale insect, leaf hopper, mealybug and thrips. Of late, the mulberry is severely affected by the spiralling whitefly, *Aleurodicus dispersus* Russell, which is recently introduced from Sri Lanka. Invasion of the pest was noticed in the crop during September - October 1996 in Coimbatore district of Tamil Nadu.

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**Whitefly - a recent introduction from Sri Lanka - has joined the band of pests that affect the mulberry severely. The article deals with the incidence of this new foe of mulberry and suggests a host of control measures**

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## Biology

The adults of *A. dispersus* are much larger than the more common *Bemisia tabaci* Genn. and are white with powdery or waxy scales all over the body and wings. (Fig. 1). The wings of newly emerged adults are clear, but develop a covering of white powder over the next few hours. The eyes are dark reddish - brown and the



Fig. 1. Adult *A. dispersus*

fore wings have two characteristic dark spots. Adults are active particularly during the morning hours.

Adults congregate on the lower surface of leaves, where they lay yellow elliptical eggs (Fig. 2) spirally covered in wax from which the whitefly derives its common name. The egg period lasts for four to six days. On hatching, the tiny first instar nymphs (Crawlers) generally settle in a spiral pattern near the eggs although some move within the confines of their leaf. The second and subsequent instar nymphs usually remain feeding in the same place. Third instar nymphs can be distinguished by the numerous evenly spaced short, glass-like rods of wax along the sides of the body. Fourth instar nymphs are soon covered with

copious amount of white materials and long glass-like rods (Fig. 3) are produced from the single pair of cephalic and three pairs of abdominal pores. The entire nymphal period lasts for 14 - 21 days. Nymphs also congregate on the lower surface of leaves and secrete large amount of white wax, covering themselves entirely at pupation, which lasts for two to five days. The total life cycle ranges from 21 - 32 days.

## Symptoms

Nymphs and adults suck sap from the mulberry leaves and cause yellowish speckling on the leaves. In case of severe infestation the leaves crinkle, droop prematurely and sooty mould often appears. Such leaves are unfit to feed the



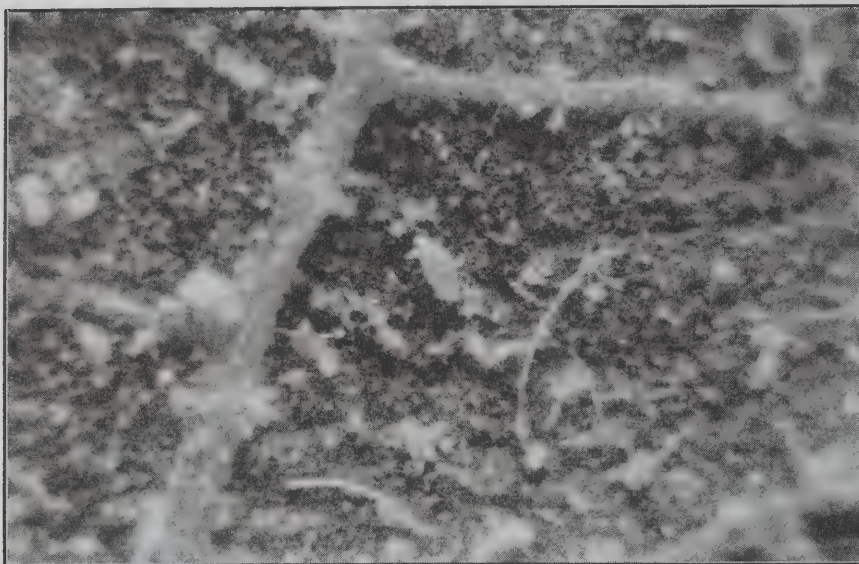


Fig. 2. A single elliptical egg of *A. dispersus*

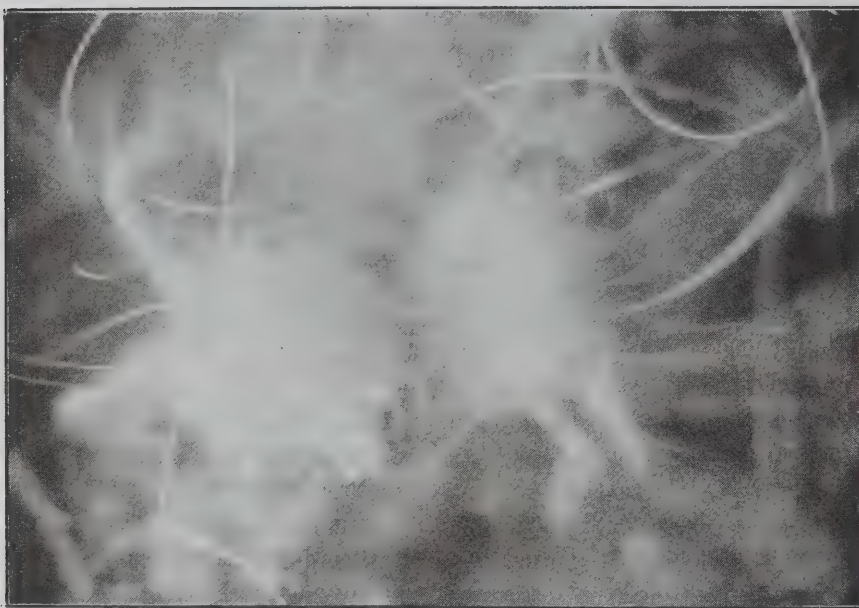


Fig. 3. Nymphs of *A. dispersus*

silkworm larvae. The infestation spreads from bottom to top.

At Coimbatore, during the severe outbreak (Oct. 1996) it was observed that the insect attacked the leaves of the mulberry varieties viz., Kanva-2, MR 2, S<sub>36</sub> and S<sub>54</sub>. The population of egg masses per leaf on an average ranged

from 25 - 56. They were mostly present at the bottom and middle leaves. The top immatured leaves harboured less egg masses than matured leaves. The number of adults per leaf ranged from 286 - 438. They were mostly found congregated on the lower surface of leaves.

## Alternate hosts

The extensive host range covers atleast 27 plant families, 38 genera and more than 100 species, including anona, banana, okra, egg plant, cassia, calophyllum, citrus, chilli, coconut, fig, guava, hibiscus, jasmine, leucinia, mango, ocimum, rose, sapota, papaya and cotton.

## Management Practices

- Collection and destruction of mulberry leaves with egg masses, nymphs and adults.
- Removal of the weed hosts.
- Monitoring the population on the cultivated alternate hosts in the vicinity.
- Setting up the yellow sticky traps @ 10/acre, to attract the adults.
- Split application of the recommended nitrogenous fertilizers.
- In nature, the grubs and adults of the coccinellid beetles, *Menochilus sexmaculatus*, *Scymnus* sp., *Cryptolaemus montrouzieri*, *Coccinella septumpunctata* and the grub of *Mallada boenensis* prey on the whitefly's nymphs and pupae.
- Spraying with Fish Oil Rosin Soap (FORS) @ 40ml/litre, dichlorvos 76 WSC @ 2 ml/litre in the early morning would minimise incidence. A safer waiting period of 15 days should be allowed for next plucking of leaves.

**The authors are with Directorate of Centre for Plant Protection Studies, Tamil Nadu Agrl. University, Coimbatore, Tamil Nadu.**

## RESPONSES

Do you feel strongly about any aspect of sericulture in the country ? Please feel free to write to the Editor. Besides your reactions to the articles published in **Indian Silk**, we welcome your thoughts on any aspect related to sericulture.



# Performance of Recommended Mulberry Varieties in Purvanchal Region

Gargi, R. Kumar, P. Shukla, R.K. Pandey, S.B. Saraswat and D. Kumar

**T**he production of bivoltine silk in India is gaining more and more importance because of its superior quality and export value. Rearing of bivoltine silkworm races needs improved technology coupled with propagation of mulberry varieties having good leaf quality in sufficient quantity during rearing seasons.

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***Propagation of improved mulberry varieties assumes greater significance in the wake of bivoltine silk production gaining momentum in India. The article deals with the field evaluation of the improved mulberry varieties recommended by CSRTIs, Mysore and Berhampore for the Purvanchal region of Uttar Pradesh with a view to demonstrate their better performance over the varieties in vogue currently.***

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Fig. 1. S-1635

Sericulture in Uttar Pradesh is being practised for the past 50 years, mainly in Dehradun and Tarai belts. Of late, emphasis is given to develop mulberry sericulture in the new areas such as Purvanchal region by launching "Purvanchal Sericulture Development Project" from June, 1993. The project is implemented in three districts viz., Varanasi, Ghasipur and Bhadohi jointly by Central Silk Board and Department of Sericulture, Govt. of U.P.

Uttar Pradesh is a land-locked state and has a central location in the plains of North India. The state lies between 23°52'E and 31°28'N, latitude and between

77°4' and 84°38'E longitude. The climate, in general, is sub-tropical monsoon type except in the Himalayan region. The Purvanchal region has the mean-maximum temperature of 43°C to 38°C during May and June against 9.9°C to 25°C during December to February. The annual rainfall in the region is between 1000 and 1150 mm, mostly in the months of July to September. The soil is alluvial with a pH range of 7 to 7.5.

The sericulture activities cannot be sustained under rainfed condition due to restricted rainfall spread over a limited period of July to September. As such, the



**Fig. 2. Kanva 2**

mulberry varieties recommended by CSRTIs, Mysore and Berhampore were evaluated for their leaf yield potential in Purvanchal region under irrigated condition to demonstrate their utility over the varieties in current

use at field level.

To generate the information on recommended varieties, 13 geno-types were planted in 90 x 90 cm spacing during July, 1994 in the field of Research Extension Centre, Varanasi. Farm yard ma-

nure @ 10 tons/ha/year in single dose was applied. Chemical fertilizer @ 100 kg N, 50 kg P and 50 kg K in four split doses was also applied. The plants were pruned twice in a year i.e., once at 30 cm height from ground level in last week of June and second time at 45 cm height in last week of November after completion of autumn rearing.

Data on various growth and yield parameters associated with overall performance of a variety were collected for two years. Leaf yield was recorded in four seasons i.e., March, April, September and mid November coinciding with rearing schedule recommended for this region. Pooled data were analysed statistically and presented in the Table.

**Moisture per cent in leaves :** The moisture percentage in leaves ranges between 69.3 in S-1 and 79.9 in S-1635 varieties.

**Table. Growth and yield parameters of various varieties**

Variety	Height of plant (m)	Total shoot length (m)	No. of leaves per meter of length	Weight of 100 Fresh leaves (g)	Moisture in leaves (%)	Days taken for bud sprouting after summer pruning	Days taken for bud sprouting after winter pruning	Rooting (%)	Leaf yield/ ha/yr in four harvests (MT)
C-763	2.12	15.01	18.20	403.00	75.30	12	38	96.20	20.71
BC <sub>2</sub> 59	1.86	12.37	19.40	511.75	77.80	14	42	69.75	20.95
Tr-4	2.24	14.50	20.25	493.00	75.90	10	36	97.00	24.46
Tr-10	2.30	10.90	19.80	409.75	79.80	10	38	93.50	21.61
S-146	1.98	12.49	19.40	386.25	78.10	12	30	82.00	21.96
S-799	1.79	11.29	23.00	277.50	75.13	12	23	77.00	18.40
S-1635	2.15	16.50	20.40	462.00	79.90	10	23	84.25	27.19
S-30	1.73	9.49	27.00	359.75	75.14	13	46	37.00	16.03
S-36	1.81	10.58	22.40	394.50	74.48	13	53	31.75	18.39
S-54	1.78	11.84	25.25	321.25	75.57	12	46	64.75	21.11
K-2	2.06	16.75	19.80	272.50	73.95	12	38	94.00	23.72
S-1	2.19	18.19	24.00	292.50	69.30	12	22	77.00	20.23
Mysore Local	2.16	12.42	26.25	170.50	70.20	12	30	95.00	18.36
CD at 5%	0.063	0.34	0.43	35.73	1.26	0.6	0.59	1.59	2.19



**Bud sprouting :** Time taken for bud sprouting is one of the most important criteria for the growth of mulberry variety particularly after autumn pruning. Time taken for bud sprouting after summer pruning did not differ much and it varies from 10 - 13 days in all the varieties. On the other hand, it ranges between 22 days in S-1 and 53 days in S-36 varieties.

**Rooting percent :** Mulberry is being propagated through saplings in most of the non-traditional areas including U.P. The saplings are grown in kissan nurseries. Therefore, the rooting performance of a genotype becomes more important to obtain maximum number of saplings in a nursery. The rooting percent in the varieties tested is as low as 31.75% in variety S-36 to as high



**Fig. 3. Tr-4**

as 97.7% in Tr-4.

**Leaf yield :** A remarkable difference in the leaf yield of the varieties was observed. Variety S-1635 topped the list with an av-

erage of 27.19 MT leaf yield/ha/year in four harvests. Varieties Tr-4 and Kanva-2 fall under second slot with 24.4 and 23.72 MT leaf yield/ha/year, respectively. The varieties S-30 and S-36 performed poorly.

The reason for poor performance in their yield is mainly due to delay in sprouting and slow growth after autumn pruning in November and prolonged winter from December to mid February.

Results show that variety S-1635 has yielded more (27.19 MT), than the other varieties in almost all the parameters and can be popularised in this region at farmer's level. However, other varieties like Kanva-2, Tr-4 can also be popularised.

**The authors are with PSDP, CSB, Varanasi (U.P.).**

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# Mulberry Gap-filling : Ghenu Shows the Way

K.B.G. Patro

**M** eet Mr. Ghenu Hontal, an ingenious and adept worker with the Mulberry Basic Seed Farm (MBSF), Dept. of Sericulture (DOS), Pottangi, Orissa, on the gentle slope of 'Panchapatmalli hill'. Apart from his sincerity and devotion to work, he has a penchant for meticulous execution of technical works and innovative ideas. Because of his enthusiasm and keen interest, his technical know-how in silkworm rearing, cocoon harvesting, grainage operation and plantation technique is marvellous.

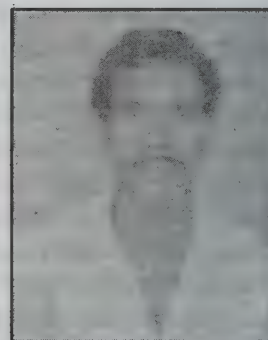
Mr. Ghenu joined the DOS as an attender in 1984 and ever since he has worked in a couple of farms and presently working with MBSF, Pottangi. His indigenous talent that prospered during the years of experience starts bearing fruit now.

While maintaining plantation fields, he observed noticeable mortality when gap-filling of any existing plantation field was done with mulberry cuttings or saplings. The reason he analysed is due to disharmony between growth of cutting/saplings on the one hand, and the surrounding bottom pruned plants on the other. Under rainfed conditions as well as in many other cases, bottom pruning of old plants, raising of new plantation and gap filling of old plantation is done at the same time i.e. arrival of South East monsoon. Ghenu observed that the bottom pruned plants grow hastily and conquer



**Fig. 1. Twig method of gap filling (close view)**

an arboreal territory depriving the gap-filled cuttings or saplings of sun light. Besides, perhaps in a



**Shri. Ghenu Hontal**

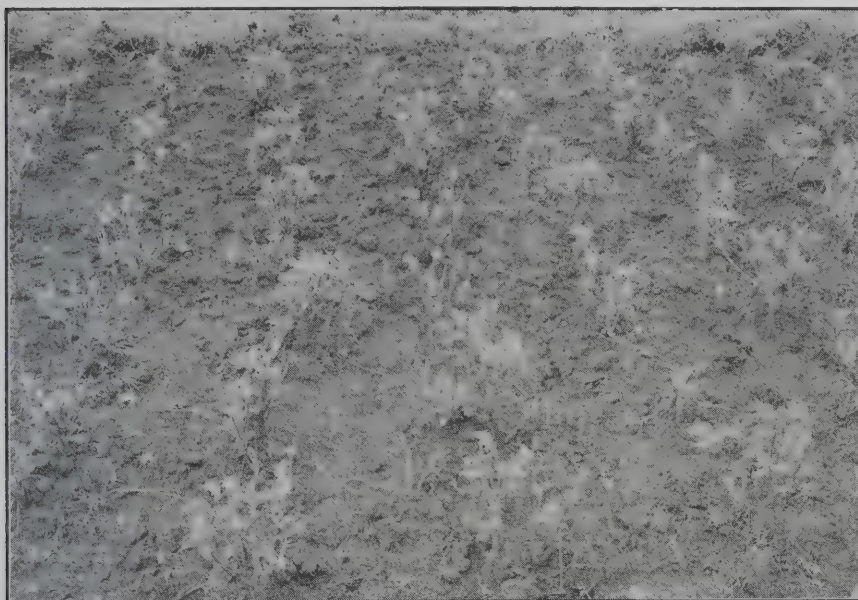
competition for life supporting materials, the 'already - live - plants' win over the 'trying-to-live' cuttings or saplings due to the former's vigour. When Ghenu's repeated attempt to fill in gaps with existing style of both cutting and sapling method failed, an idea germinated in his faculty of thinking offering a solution.

Dwelling deep into the reasons



**Fig. 2. Twig method of gap filling (distant view)**





*Fig. 3. Twig method of gap filling (Plantation position after 2 years)*

causing mortality, he attempted to fill gaps with big sized twigs. For this, he chose quality twigs from healthy plants and dressed them for gap-filling. The process of dressing involved cutting of twigs into a uniform size of about 80 cm. The two terminals of twig are cut following the CSB style - the base diagonally and the tip horizontally. The twigs are planted following procedures practiced in the cuttings method of plantation. The difference being only in the number i.e. @ two twigs planted per pit. Replying to a query, he disclosed that three cuttings are planted in cutting style operation, perhaps to compensate mortality. At least one cutting would survive is the hopeful calculation. But in twig-method, mortality is a rare

phenomenon and two twigs are enough per pit. Ghenu expects that with passing of time, gap-filled twigs can grow luxuriantly as there is no question of obtrusion from sunlight by the neighbouring plants due to the height of the twigs.

Ghenu has repeated his successful experiment many times before. This year he has planted twigs to fill in two plots of old plantation (at MBSF) where at the same time bottom pruning was also conducted. Figs. 1 and 2 show position of twigs as well as the neighbouring bottom pruned old plants after 25 days of launching the operation. It may be seen that the height of the twigs (with fresh sproutings) can nullify chances of obtrusion of sunlight

by the neighbouring fast growing pruned companions. In addition, it seems that twigs have more vigour to withstand mortality than the smaller 10-15 cm cuttings. Study is being initiated at MBSF, Pottangi for an indepth observation.

The gap-filled 'twig turned plants' grow so nicely that later on it is difficulty to isolate them from old neighbouring plants. This can be seen from Fig. 3 (taken on fifteenth day of bottom pruning this year), where about 10% gap-filling was conducted in June 1995 by twig method. It may be seen that all the plants (gap filled as well as old) have normal appearance.

Since most of the mulberry grown areas are rainfed in Orissa, mortality is often observed among plantation fields. The rearers, often, develop abhorrence due to repeated failures of the gaps filled. At this juncture, Ghenu's findings would help them revive their fields providing a some-what permanent solution besides savings in cuttings, chemicals, fertilizers and labour due to avoidance of repeated gap filling. When he was told that his idea is expected to save mulberry rearers throughout the country, his eyes filled with tears of joy. Never in his life he thought that his primitive idea could be of help to the sericulture.

*The author is with ESS, Pottangi, Koraput, Orissa.*

### **CSB Literature**

In the background of growing interest in sericulture and silk industry in the country, there appears to be considerable demand for sericulture related literature. The Central Silk Board, in its service to the community of sericulture and silk industry publishes from time to time brochures, books, periodicals not only in English and Hindi but also in many Indian languages. Educative video cassettes on various technologies in Indian and foreign languages help you practise sericulture the right way. For details, please refer to **Indian Silk**. Indent your copies, Today.

# Rearers' Classification, Technology Adoption and Extension Package

B.K. Gupta and Y.K. Gupta

**T**here is a trend to classify people of different section to study their economic levels so that attempts could be initiated to improve their living conditions. In agriculture and allied sectors, farmers are classified as small,

**Adoption of improved technologies and package of practices and methods, as recommended by the research institutes for pursuing sericulture, varies from farmers to farmers due to their heterogeneous compositions. This gap between lab and land paves way for yield gap. The article deals with a study conducted in the three traditional districts of West Bengal to classify rearers mainly based on their resources, adoption level of technology and recommended package of practices.**

marginal, medium and big farmers on the basis of their land holdings.

Now-a-days, improved technologies of all rural based industries are propagated among the people to improve the yield and quality of the products through the extension functionaries and to uplift their economic conditions.

Research institutions have developed high yielding varieties of mulberry and silkworm hybrids, improved packages of practices for cultivation and rearing and evolved the prophylactic measures to control pests and diseases. At the same time, sericulture extension is persuading the farmers to adopt the improved technologies for their benefit and industry as well. It is often noticed that there exists a gap between lab and land

in respect of adoption of technology and production of cocoon as the field is composed of heterogeneous people. Thus, a study has been initiated to classify silkworm rearers on the basis of their resources and adoption levels of improved material and methods.

## Lay-out of the programme

**Area of Operation :** Three traditional districts of West Bengal viz., Malda, Murshidabad and Birbhum were selected.

**Potential TSCs of CSB:** Two in Malda (Sujapur and Mothabari) and one each in Murshidabad (Panchgram) and Birbhum (Bhadrapur) were considered.

**Number of Rearers :** 350 rearers under each TSC were proposed to be covered for the study.

**Table 1. Classification of Rearers**

Group	Land available (Deci)		Av. Mulberry & Rearing Appliances				Distribution	
	Total	Mulberry	Land (Desi)	Rearing Tray (No)	Mountage (No)	Rearing Stand (No)	Rearers (%)	Land (%)
I	19.93	1 - 16	15.15	16	12	1	15.12	76.02
II	57.32	17 - 33	29.09	16	12	1	30.73	50.75
III	103.40	34 - 50	47.26	24	18	2	21.43	45.71
IV	139.74	51 - 75	66.44	28	21	2	13.49	47.55
V	205.35	76 - 100	91.95	42	32	2.5	12.13	44.78
VI	261.60	101 - 150	136.03	80	60	5.0	3.00	52.00
VII	316.28	151 - 200	183.33	70	53	4.5	3.40	57.96
VIII	874.50	200 & above	253.66	50	38	3.0	0.70	29.00



**Table 2. Assessment of rates of inputs and cocoon yield against recommendation**

Group	Manure & Fertilizer/ha/year				Mandays (No)/ha/yr		Dfls (No)	Cocoon yield
	FYM(Mt)	N(kg)	P(kg)	K(kg)	Cultivation	Rearing	Ha/yr	(kg)/ha/yr
I	37.95	433.81	34.25	17.75	710	993	11962	1664.18
II	27.49	311.87	9.40	10.48	713	705	7450	1075.10
III	24.60	224.55	13.45	20.84	709	608	5940	847.18
IV	25.97	251.19	11.99	16.36	711	573	5373	854.68
V	20.00	199.36	12.75	39.18	712	575	6243	816.18
VI	17.88	178.36	51.47	32.08	713	698	7410	943.45
VII	17.25	181.77	4.06	9.02	713	543	4805	521.80
VIII	3.01	155.09	0.00	0.00	713	300	2438	287.45
Recommendation	22.00	336.00	180.00	112.00	750	1000	6250	1561.25

*Parameters to study* : Each farmer's data related to

- resources
- inputs used in mulberry cultivation and silkworm rearing, and
- Dfls consumption and cocoon yield of all commercial crops.

A total of 1489 rearers was covered (Malda- 728, Murshidabad-428 Birbhum-333).

### Methods of analysis

Rearers were classified on the basis of their land holdings, rearing appliances and their distributions (%) were worked out on the basis of frequency analysis.

On-farm inputs applied and cocoon yield obtained by different groups of rearers were assessed.

Inter co-relation studies among different inputs (FYM, NPK and Dfls) were carried out.

Direct and indirect effects of inputs on cocoon yield were analysed.

Gaps between lab and land in respect of inputs and yield were also worked out.

Output – input ratios of different groups of rearers were studied.

### Classification of rearers

On the basis of mulberry land holdings and rearing facilities, rearers are classified into eight different groups (Table-1).

Table 1 shows that there is an increase in land holding from group I to VIII which ranges from 19.03 decimal (Group I) to 874.50 dec. i.e., 8.745 acres (Group VIII). It is noticed that there is regular increase in mulberry plantation from group I (15.15 dec.) to group VIII (253 dec. i.e., 2.537 acres). As regards rearing appliances, farmers of groups I and II have capacity to rear one *ghara* (16 rearing trays of 6' x 4') silkworm larvae while groups III to VI are increasing their rearing capacity by way of arranging more rearing appliances, but that of farmers of groups VII and VIII are found reducing their rearing capacity.

Out of total rearers, 15.12% belongs to Group I while group II is maximum (30.73%). Thereafter, reducing trend in respect of participation of farmers in sericulture is pronounced. As regards distribution of land in mulberry cultivation out of their total land holdings, farmers of group I are contributing maximum land

(76.02%) in mulberry plantation but the farmers of group VIII utilized minimum land (29.00%) in mulberry plantation. However, a mixed trend is observed in respect of farmers belonging to group II to VII.

### Cocoon yield in respect of inputs

It is clear from Table-2 that rearers of group I are applying maximum amount of FYM in their mulberry field and from group II onwards, there is a tendency of decreasing the amount of FYM except group IV. Similar observation was found in respect of application of nitrogen fertilizer from groups I to VIII except group VII. As regards phosphate and potash fertilizers, rearers of all groups are applying sporadically.

There is also a gradual decrease in utilization of mandays in silkworm rearing from groups I to VIII except group VI. As regards rearing of silkworm dfls (number) except group V and VI, there is also a gradual decrease in dfl consumption from group I to VIII. All these inputs are reflected on cocoons yield obtained by different groups of rearers. The rearers of group I harvested maximum cocoon (1864.18 kg/ha/yr) which is followed by groups II, VI, III, IV, V, VII and VIII. Thus, the rearers of group I are composed of innovators and early adopters while groups VII and VIII are considered laggards. The rearers of group III belong to early majority and the rest falls into the group of late majority. The behaviour of silkworm rearers as compared with that of other farming community has not been investigated earlier.

### Adoption level of technologies

Keeping in view the heterogeneity existing among

**Table 3. Inter Corelation Studies**

Corelation Between	Inputs				
	FYM	N	P	K	DFLs
N	0.8935**				
P	0.3757	0.2661			
K	0.2697	-0.0340	0.5689		
DFLs	0.8705**	0.8600**	0.6630	0.3607	
Cocoon Yield	0.9196**	0.9092**	0.6049	0.3278	0.9812**

\*\* Shows significant level at 1%

different groups of rearers and inputs applied, it is essential to assess the rate of inputs and cocoon yield of rearers falling under different groups (Table-2).

It is interesting to note that farmers of group I are applying higher dose of FYM (37.95 MT/ha/year), nitrogenous fertilizer (433.81 kg/ha/year) and dfl consumption/ha/year is also found higher (11962 nos.). Therefore, the farmers of group I, though regarded as resource poor farmers (RPFs) are showing tendency of over adoption. Rearers of group II are also showing over adoption in respect of FYM (27.49 MT/ha/yr) and dfl consumption (7450 nos./ha/yr). On the other hand, rearers of groups III and IV are showing over-adoption in respect of FYM but the rest of groups in respect of inputs both in mulberry cultivation and silkworm rearing are showing under-adoption including the manpower requirement. From group V onwards, there is a gradual decrease relating to all inputs towards mulberry cultivation and silkworm rearing. Thus, both over and under-adoptions are prevailing in the field of sericulture.

As regards cocoon yield, farmers of group I are capable to harvest more cocoons than expected from recommended package of practices. In nutshell, it can be stated that resource poor

farmers (RPFs) are incurring more cash on inputs than resource rich farmers (RRFs).

### Inter-corelation studies among inputs in relation to cocoon yield

It is observed that highly significant positive co-related co-efficients exist between FYM and nitrogenous fertilizer, dfl consumption and cocoon yield. Simultaneously, highly significant positive correlation coefficient is found between nitrogen fertilizer and cocoon yield. Lastly, there also exists highly significant positive correlation coefficient between dfl consumption and cocoon yield (Table-3).

Since farmers are sporadically applying phosphatic and potash fertilizers, there is no significant co-relation coefficient in relation with farmyard manure, nitrogen, dfls reared and cocoon yield. Therefore, sericulture extension may take initiation to popularise, phosphate and potash fertilizers

keeping in view the improvement in yield of mulberry leaf and cocoon at rearer's level.

### Direct and indirect effects of inputs on cocoon yield

On the basis of field data, direct and indirect effects of inputs on cocoon yield were also analysed and presented in Table-4.

It is confirmed that there are highly positive significant co-relation co-efficient between FYM and cocoon yield, nitrogenous fertilizer and cocoon yield and dfls consumption and cocoon yield.

### Regression analysis

Based on the above statistical analysis, regression equations between cocoon yield (Y) and FYM (X), cocoon yield (Y) and nitrogen fertilizer (X) and cocoon yield (Y) and dfls consumption (X) have been developed and presented in Table-5. These regression equation will be of great help to assess cocoon production at rearer's level in future.

### Gap analysis between lab and land

The study would be incomplete if the gap analysis between technology adoption at field level and technology recommendation at lab level was not investigated. The gap analysis in respect of inputs both in mulberry cultivation and silkworm rearing, cocoon yield, value of cocoons and profit/ha/yr

**Table 4. Direct and Indirect effects**

Correlation Between	Inputs					
	FYM	N	P	K	DFLs	Cocoon yield
FYM	0.0830	0.5919	0.0817	0.0415	0.1216	0.9196**
N	0.0741	0.6624	0.0578	-0.0052	0.1201	0.9092**
P	0.0312	0.1762	0.2174	0.0875	0.0926	0.6049
K	0.0224	-0.0225	0.1237	0.1538	0.0504	0.3278
DFLs	0.0722	0.5697	0.1441	0.0555	0.1397	0.9812**
Residual effect : 0.0025						

\*\* Shows significant level at 1%



**Table 5. Regression Analysis**

Regression Analysis Between	Regression Equation
Cocoon Yield (Y) and FYM (X)	$Y = 73.661 + 36.869 X$
Cocoon Yield (Y) and N (X)	$Y = -103.869 + 4.009 X$
Cocoon Yield (Y) and DFLs (X)	$Y = -56.898 + 0.145 X$

was also carried out and presented in Table-6.

The positive sign indicates over adoption, more yield and more cash value over the recommendation whereas the negative sign has been under adoption, less cocoon yield and loss. It is to be pointed out that no farmer of any group is capable to earn profit from sericulture practices. However, they are capable to earn wages by employing their own family members. Therefore, unless they adopt recommendation of research institution in toto, sericulture appears to be pursued by them to utilize their family

labourers and earn wages.

The extent of profit varies from -38.06% (Group I) to -130.25% (Group VII). Thus, the extension functionaries in sericulture must pursue with all efforts to implement research recommendations at field level.

### Output-input ratio

The output-input ratio should not be less than 1.00. The output-input ratio of recommendation of sericulture has been found 1.48 but the rearers of group II are in a position to get output-input ratio of 1.49 which is followed by group I (1.23), group IV (1.14), group V

(1.10), groups III and VI (1.06 each) whereas output-input ratio of groups VII and VIII are 0.77 and 0.70, respectively (Table-7). It is worth noting that farmers of groups II, I, IV, V, III and VI could be easily motivated to adopt improved technology recommended by research institutes. Farmers belonging to group I to V are considered as potential farmers and they cover 92.9% of total sericulture farmers in the traditional districts of West Bengal.

### Evolution of extension package

It appears that the technology package developed by research institutes is not fully adopted by the farmers. Thus, attempts are also initiated to develop extension package so that the evolved technology package would be suitable to the farmers' situation. Such extension package is developed

**Table 6. Gap Analysis between lab and land of different sizes Of Sericultural Farm (In Percentage)**

Rearers Group	Gap between lab and land									Total Expn. Ha/yr	Total Cocoon Yield Ha/yr	Value of Cocoon/ Ha/yr	Profit/ Ha/yr
	Mulberry Cultivation					Silkworm Rearing							
	FYM	Nitrogen	Phosphate	Potash	Expenditure	Rearing	Spinning Trays	Dfls	Expn.				
I	+72.50	+29.11	-80.97	-84.15	-8.47	+65.00	+65.00	+91.42	+48.76	+27.87	+6.59	+6.59	-38.06
II	+24.95	-7.19	-94.74	-90.64	-18.55	-13.75	-14.16	+13.21	-9.02	-12.50	-31.14	-31.14	-70.22
III	+11.82	-27.22	-92.52	-81.39	-21.63	-20.62	-20.83	-4.96	-26.04	-24.42	-45.85	-45.85	-90.79
IV	+18.05	-25.24	-93.34	-80.39	-20.40	-34.37	-34.16	-14.03	-33.88	-28.94	-45.26	-45.26	-79.47
V	-9.09	-40.66	-92.92	-65.52	-25.16	-28.75	-27.50	-0.13	-32.17	-29.60	-47.72	47.72	-85.73
VI	-18.73	-46.92	-71.40	-71.40	-26.74	-8.12	-8.33	+18.56	-9.39	-15.74	-39.57	-39.57	-89.55
VII	-21.59	-45.90	-97.19	-91.15	-25.56	-40.00	-40.00	-23.08	-40.99	-36.22	-66.58	-66.58	-130.25
VIII	-86.36	-53.84	-100.00	-100.00	-42.53	-69.37	-68.33	-60.95	-71.69	-61.01	-81.59	-81.59	-125.05

**Table 7. Assessment of output-input ratio of different groups of rearers**

Farmers group/ Expenditure/Yr/ Ha (Rs.)	I	II	III	IV	V	VI	VII	VIII	Recommendation
Mulberry Cultivation	23029.37	20493.29	19718.15	20026.08	18830.15	18432.27	18122.97	14458.62	25159.65
Silkworm Rearing	64851.48	39632.22	32217.52	28801.93	29545.41	39468.50	25750.00	12339.94	43585.00
Total Expenditure	87880.85	60125.51	51935.67	48828.01	48375.56	57900.77	43872.97	26798.56	68744.65
Value of Cocoon	108172.00	89882.00	54952.00	55554.00	53051.00	61324.00	33917.00	18648.00	101481.00
Output-Input Ratio	1.23	1.49	1.06	1.14	1.10	1.06	0.77	0.70	1.48

**Table 8. Extension package for mulberry sericulture under irrigated condition**

Item	Recommendation
Mulberry variety	S1/S1635/K2
Optimum mulberry area/farmer	1.0 acre
Spacing	6" x 18"
Pruning of mulberry branches	
before spring rearing	9" above ground
before summer rearing	Ground level
before rainy rearing	9" above ground
before autumn rearing	Ground level
FYM application/yr/acre	8.8 Mt.
Chemical fertilizers/yr/acre	
N(Nitrogen) fertilizer	134.4 kg in four split doses
P <sub>2</sub> O <sub>5</sub> (Phosphate) fertilizer	72.0 kg in two split doses
K <sub>2</sub> O (Potash) fertilizer	44.8 kg in two split doses
Irrigation period	In between post & pre rainy seasons
Water requirement/application	1.5 acre inch
Irrigation method	Channel irrigation after two rows
Labourers for mulberry cultivation/ac/yr	300 mandays
Rearing room (1 ghara = 16 trays/stand)/acre	4 Ghara
Rearing stand (16 trays)/stand/acre	4 stands
Bearing trays/acre	64 No.
Spinning trays/acre	48 No.
Cleaning nets/acre	128 No.
DFLs required/acre	
Autumn (Multi x Bi) season	375 No.
Spring (Multi x Bi) season	375 No.
Summer (Multi x Multi) season	750 No.
Rainy (Multi x Multi) season	875 No.
Number of dfls/tray	
Multivoltine	12.5 dfls
Multi x Bi	6.0 dfls
Labourers for rearing/year/acre	400 mandays
Disinfection with 5% bleaching powder sol.	Pre & post rearing disinfection
Bed disinfection with Labex	
Control of uzi fly infestation	Spraying of 2% Bleaching powder solution
Harvest of cocoons on	5th day of spinning
Drying of cocoons	7-8th day of spinning

on the basis of following findings :

Cocoon production of Resource Rich Farmers (RRFs) is not satisfactory and the number of these farmers is also considerably small though these farmers are utilising more land for mulberry cultivation. Thus, law of diminishing return plays great role in less

cocoon yield. Therefore, the optimum size of mulberry farm is found 1.00 acre and it should not be more than 1.36 acres.

The total cocoon yield of farmers of group I/acre/yr was found more than that expected from recommended technology package. Yet, cocoon yield/100 dfls of rearers of Group I, II, III, IV, V, VI,

VII and VIII are 13, 19, 14.43, 14.26, 15.90, 13.80, 12.73, 10.86 and 11.79 kg, respectively is very less because recommended package of practices ensures 24.98 kg cocoon yield/100 dfls. The low cocoon yield at farmers' level is due to the fact that the farmers are not uniformly rearing multi x bi hybrids of silkworm eggs during favourable rearing seasons i.e., Agrahani (Autumn) and Chaitra (Spring).

There is too much curtailment in labourers for silkworm rearings from farmers of Group II onwards. The curtailment of labourers during silkworm rearing ranges from 20.5% (Group II) to 70.0% (Group VIII). Thus, silkworm rearing is not properly attended by rearers from Group II and above.

It is to be mentioned that farmers of Group II and VI utilized 705 mandays as against rearing of 7450 dfls and 698 mandays for rearing 7410 dfls and harvested cocoons 1079.10 kg/yr/ha and 943.45 kg/yr/ha, respectively. So, the labourers (number of mandays) used should be proportionate to the quantity of dfls to be reared.

The rearers should be advised to rear requisite quantity of dfls on the basis of area of mulberry plantation and rearing capacity. The frontline organisations should arrange to supply multi x bi hybrids in favourable seasons and multi x multi hybrid dfls in adverse rearing seasons. Only by rearing hybrid dfls, cocoon yield/100 dfls could be increased and at the same time cocoon quality could be improved to a great extent.

The foregoing decision will also be helpful to draw extension package for the Gangetic alluvial region.

**The authors are with Central Sericultural Research and Training Institute, Berhampore (WB).**



# Impact of Abiotic Factors and Microclimate on Cocoon and Seed Productivity of *A. mylitta*

S.K. Saxena, G.S. Yadav, P. Somasundaram, V.K. Harlapur and R. Srinivasu

**C**handrapur is one of the natural tasar belts of tropical, dry, deciduous mixed forest belt of Bhandara, Gadchiroli and adjoining districts of Maharashtra. The

**A study conducted in the fields of BSM&TC, Chandrapur revealed that effluents emanating from the industrial units of the area adversely affect the environment, alter the temperature and humidity and derail the metabolism of silkworms. This all leads to dwindling cocoon and egg productivity of tasar silkworms. The authors narrate the deleterious effects of industrial effluents with particular reference to tasar silkworms.**

district Chandrapur lies in the latitude of 19-56°N and longitude 79.21°E. The topography is plateau type.

## Climate

The temperature of the district

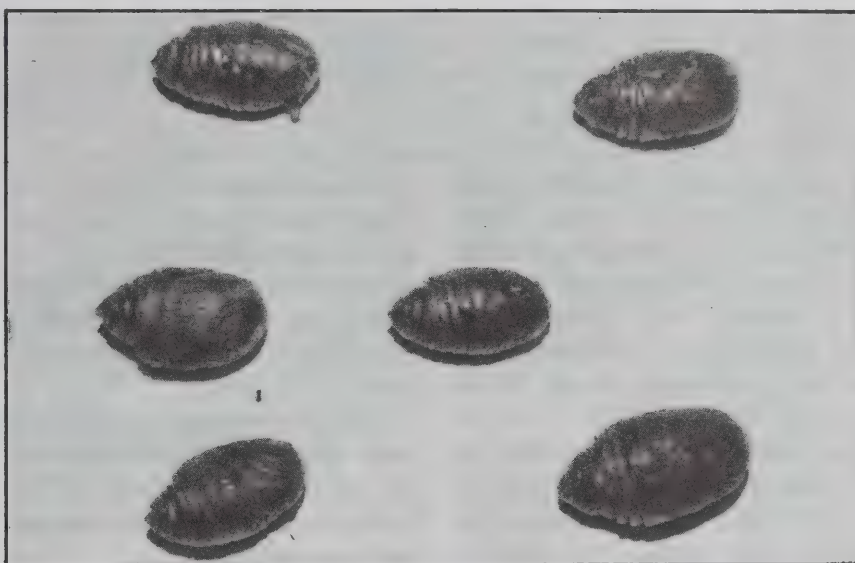


Fig.1. Pupal mortality due to Bacteriosis

ranges from 25.3 to 43.68°C in summer and 12.03 to 32.53°C in winter and relative humidity between 22.46 and 85.91%. The area recorded approximately 1260 mm rainfall in 61 days from January to October (Table 1).

Soils are lateritic. Texture of soil varies from sandy to sandy loam. The soil of the BSM&TC, Chandrapur where rearing programme being conducted is having a pH of 7.1, E.C. in mm. hos/cm<sup>3</sup> 0.15, Nitrogen 0.18%, Phosphorous 18 kg/ha, Potash 256 kg/ha indicating deficiency of Nitrogen, Phosphorous and all micronutrients.

## Impact of Abiotic factors

One of the major factors that

contributes to the viability of tasar silkworm biomass is the prevailing temperature and microclimate of the field which helps in converting the green biomass for productivity of cocoons and egg production. Temperature is a major factor that decides the maximum intake of food and also better digestion of proteinaceous matter of the standing biomass. Humidity also plays a major role in the continual intake of the food to the adlibitum level. Humidity directly influences the amount of ingestion, digestion and digestibility, pH value of the silkworm blood, carbondioxide expiration etc. The indirect effects are drying of leaves in the field and their unsuitability as feed. Exposure of young age silkworms

**Table 1. Climatological conditions of Chandrapur**

Year (1995)	Temperature		Relative Humidity		Rainfall	
	Min (°C)	Max (°C)	Min (%)	Max (%)	Raindays	Rainfall (mm)
Jan.	12.03	27.25	50.66	84.87	6	94.25
Feb.	15.58	34.16	44.33	74.64	—	—
Mar.	20.45	37.85	40.80	66.50	3	30.71
Apr.	22.66	43.68	22.46	48.95	4	34.00
May	23.39	43.06	26.60	50.93	3	23.30
Jun.	25.30	41.11	38.48	60.19	9	226.41
Jul.	23.74	32.25	68.16	85.05	10	278.20
Aug.	24.48	31.61	65.43	85.91	11	318.04
Sep.	23.86	33.96	61.88	85.01	9	112.71
Oct.	23.06	33.03	57.50	94.71	6	142.82
Nov.	17.90	32.56	46.29	72.09	—	—
Dec.	14.82	32.53	38.36	78.21	—	—
Annual	12.03	43.68	22.46	85.91	61	1260.44

(I and II instars) to humidity above 90%, particularly during rainy season will spell danger and make the silkworms susceptible to various diseases. Any alterations in the temperature and humidity, so as to say, a change in the microclimate brings about a drastic derailment in the metabolism of silkworms thus, affecting productivity. Productivity can be measured as a total number of cocoons produced and also the quantity of eggs laid by the moths. Such a yard stick may be useful to know whether the abiotic factors in a particular environment is properly sustaining the productivity.

BSM&TC, Chandrapur is located in the vicinity of various industries viz., paper mill, steel, coal mines and thermal power stations. These industries emit lot

of effluents causing a highly hazardous environment to the forest system of the area. The impact of such altered microclimate has been deciphered through the dwindling of cocoon production for the past years.

Various information has been made available by different workers to show the effects of air pollution on plants. The air pollutants seem to produce deleterious effects on biomass productions at two major levels, the microscopic effects like foliar injury, appearance of chlorotic spots of leaves, falling of leaves, wilting of younger leaves, stunted growth and the microscopic effects like damage to leaf tissues.

The result of the effect of temperature, humidity, air pollutants on the third crop rearing and

first grainage performances is given in the Table Nos.2, 3, 4 and 5. A perusal of the result of third crop rearing indicates clearly that cocoon productivity is very much meagre. It is well known that exchange of gases between plants or living biomass and the atmosphere is an essential feature of physiological processes like photosynthesis and transpiration (in plant biomass) and respiration (in living biomass). In view of the toxic effect of various air pollutants, different physiological phenomena are disturbed to some extent causing pathological symptoms leading to heavy incidence of mortality as evidence in the present experimental trials of tasar silkworms rearing in the selected field area. The cause for such bacteriosis may be linked with release of too much abnoxious gases like ammonia, sulphur dioxide and carbon monoxide from the industries. Such gases emanating from many industries of Chandrapur area conforming to the threshold levels of release pollute the environment of the field and their modulatory effects on cocoon and egg productivity of tasar silkworms are being discussed with available data from the recent investigations of silkworm rearing performances. From the data on egg productivity (Table 5), it is clear that moths that emerged after sustaining all hazardous effects of the changed polluted environment could not

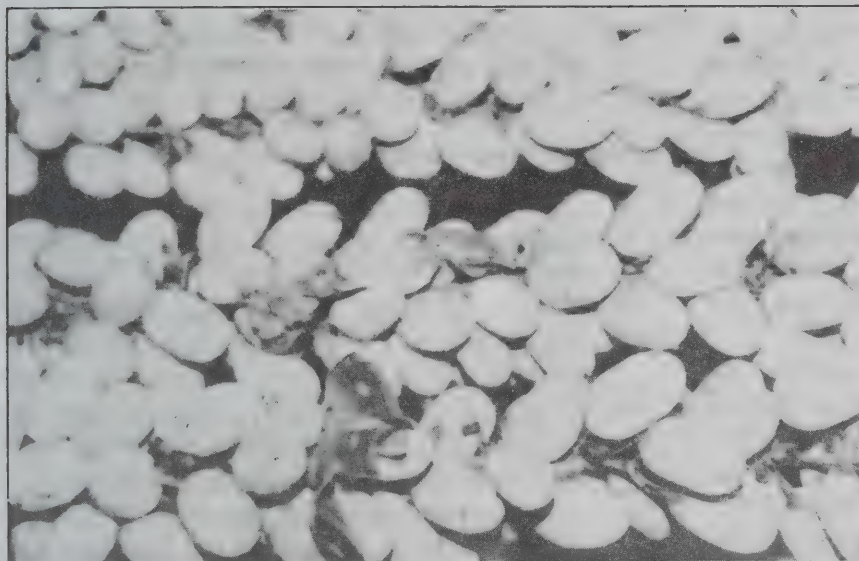
**Table 2. Abiotic factors during the period of preservation of seed cocoons for egg productivity (1996)**

Month	Outdoor				Rainfall (mm)	Indoor			
	Temperature (°C)		Relative Humidity (%)			Temperature (°C)		Relative Humidity (%)	
	Max.	Min.	Max.	Min.		Max.	Min.	Max.	Min.
Feb.	35.66	17.72	64.57	27.76	Nil	31.15	18.19	68.96	40.89
Mar.	41.5	18.93	43.67	18.08	Nil	31.35	19.16	56.54	37.41
Apr.	42.0	24.43	62.19	40.79	30.94	31.03	22.69	69.53	56.36
May	47.52	25.46	47.00	27.62	Nil	33.19	24.15	67.90	51.68
Jun.	42.33	24.59	57.31	32.78	127.2	32.23	24.69	72.78	62.80



**Table 3. Abiotic factors during the period of silkworm rearing for cocoon productivity (1995)**

Month	Outdoor				Rainfall (mm)
	Temperature (°C)		Relative Humidity (%)		
	Max.	Min.	Max.	Min.	
Nov.	32.56	17.90	72.09	46.29	Nil
Dec.	32.53	14.82	78.21	38.36	Nil
Jan.	33.12	15.49	79.39	39.36	Nil



**Fig. 2. Morphological deformities due to infection and air pollutants**

lay more number of eggs. The major factor that can be contributed to poor egg laying capacity of the mother moths is due to the weakness of the various developmental stages that confronted with modified microenvironment by

industrial pollutants. Such environment affected the various metabolic processes of tasar silkworm *viz.*, respiration, ingestion, digestion, etc. which resulted in poor intake of standing biomass.

Apart from this, the modified

microclimate caused various morphological deformations in the adult stages as it can be seen from the emerged moths and sometimes death of pupa inside the cocoon (Figs. 1 and 2).

## Conclusion

It has been observed from the present investigation that success in cocoon productivity of tasar silkworm affects even by slight variation in the microclimate as it can be from the BSM&TC, Chandrapur field. It has been established by Shri S.P. Chatthopadhyay, Scientist through experimental studies on leaf surface effects of air pollution on certain tree species in Calcutta that air pollutants directly affect the cuticle of leaf surface causing inferior quality of biomass production. A similar phenomena of distortion in the physiology of silkworm biomass with a reduction in the various yield parameters have also been observed in the present study. Further, such investigation indicates that a kind of new genetic race that could withstand this type of hazards may be found out and tried for a few years for better results. In addition, the soil of the BSM&TC, Chandrapur needs additional chemical inputs to set right deficiency of nitrogen, phosphorous and micronutrients so as to induce natural resistance in the silkworms which are ultimately deciding the quantum of cocoon production and multiplication. Industries of Chandrapur may be advised to innovate an alternative system for the release of effluent in such a way that it should not be harmful either to animals or human beings.

**The authors are with BSMTC, Chandrapur except the second who is with RTRS, Bhandara, Maharashtra.**

**Table 4. Tasar silkworm rearing and its productivity during the period of third crop 1995-96**

Eggs kept for brushing (No.)	Worms brushed (No.)	Hatching (%)	Cocoon produced (No.)	Larval mortality (%)
3,49,171	2,19,024	62.72	35,100	83.97

**Table 5. Egg productivity of tasar silk moth of first seasonal grainage (1996)**

Eco race	Wt. of single moth (gm)	No. of eggs laid/moth	No. of eggs retained/moth	Total eggs/moth
DTV	0.37	38	48	86
DTV	0.39	45	26	71
DTV	0.30	22	33	55
DTV	0.32	38	56	94
DTV	0.33	21	22	43
Avg.	0.34			

# Seth Baldeodas Shah Award

**C**entral Silk Board (Ministry of Textiles, Government of India) has proposed to give **SETH BALDEODAS SHAH AWARD** instituted by M/s. Seth Baldeodas Shah Charitable Trust, Calcutta to individuals/companies/ organisations who have made noteworthy contributions towards development of sericulture and silk industry. It covers all aspects of sericulture and silk industry viz., research, technology, development from host plant to cocoon production as well as post-cocoon processes like reeling, spinning and yarn/fabric processing in both mulberry and non-mulberry sectors, by scientists, sericulturists or individuals on behalf of their own or an organisation/company.

The award is conferred once in a year for the outstanding contributions made during the year for the development of sericulture and silk industry in India. Presently, four awards, one each for the years 1993-94, 1994-95, 1995-96 and 1996-97 will be given. **THE AWARD CARRIES Rs. 25,000/- IN CASH AND A MERIT CERTIFICATE.** Entries for the award should be forwarded in the prescribed format to the Member Secretary, Central Silk Board, CSB Complex, B.T.M.Layout, Madivala, Bangalore - 560 068. The last date for the receipt of the entries is January 30,1998.

## Eligibility Criteria

The entries should be original, innovative and relate to a new technique/process/variety/fabrication evolved/developed that significantly benefited the sericulture industry for the last five years, in any of the following:

- Outstanding contribution made for host/food plant development/evolution of new variety both under mulberry and non-mulberry sectors of silk industry.
- Outstanding contribution made for development/evolution of silkworm race/silkworm rearing practices and its management both under mulberry and non-mulberry sectors of silk industry, including pest/disease detection, prevention and control.
- Outstanding contribution made for development/fabrication of silk processing and

weaving technology/machinery/equipment both under mulberry and non-mulberry sectors of silk industry.

- Technology development/farm development in sericulture as a whole and its management or any part of it having a significant impact on the growth and development of the industry.

## Terms and conditions

- \* The award is open to individuals, who are Indian citizens, group of scientists, companies/organisations and institutions.
- \* If the entrants are a group, the names of all should be given and if selected, the award amount will be shared equally among them.
- \* All the entries **MUST** be accompanied with an undertaking in the prescribed proforma. Further, entries from the scientists working in a company/association/institution etc. should be attested and forwarded by the Head of the institution.
- \* If the entrant is a company/organisation/institution/association, the application should be signed by the head/authorised signatory. Award will be made to the company/organisation/institution/association only.
- \* The applications received after the prescribed date will not be considered.
- \* If the award committee, while evaluating the entries, feels that additional information is required, the entrant(s) will have to make available the information, failing which the entry will be cancelled.
- \* The name(s) of the awardees will be published in Indian Silk and also informed separately.
- \* In case no entry is received for a particular year(s) or qualifies for the grant of award, the value of the award will be carried forward to the next year(s) and utilised in a manner decided by the Board in consultation with the Trust.
- \* In all matters arising out of the award, the decision of the Award Committee shall be final and no correspondence on complaints of whatsoever nature will be entertained.



## F O R M A T

- 1 a. Name(s) of the entrant(s) in block letters :  
b. Occupation(s) and official designation(s).
2. Full postal address(es) :
- 3 a. Whether the applicant is in : Individual  
individual capacity or on behalf of Company/Association/Institution  
Company/Association/Institution  
(Strike off which ever is not applicable)  
b. Name and address of the organisation :
4. Subject/Field/Title of the entry :
5. Year for which the entry is sent. :
6. Brief resume of the entry (in not :  
more than one page). Attach six (6)  
copies of detailed report and notes  
about the achievements made.

Signature

## U N D E R T A K I N G

I hereby undertake to state that the entry submitted entitled ..... is my/our own contribution and research work and no one else is associated/.....is associated in the said research/technological contribution in the field of .....

**Name(s) and signature(s)  
of the contributor(s)**

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### Attestation by the Head of the Institution

This is to certify that the research contribution/technology development/innovation in the field of .....is originally by Shri/Smt.(names of the individuals or group members) .....and it is true and correct to the best of my knowledge and satisfaction.

Shri/Smt..... has/have also been associated/no one else has been associated in the said contribution.

**Signature of the Head of the  
Institution with seal**

Our dynamic research and extension wings are engaged in the upliftment of the socio-economic conditions of the sericulturists of the country and are intensifying their efforts so that the generations of tomorrow may have a bright future

# HOPE IS HERE !



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CENTRAL SILK BOARD



# Arjun Plantations under Social Forestry

S.K. Tiwari

**I**n the present era of rapid industrialisation, every project is attempting to establish eco-friendly projections for its social acceptability. The industrial units function under permissible level of pollution of air, soil, water etc., on

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**Korba - the 'power city' of India - is falling under the industrial belt of Chattisgarh region of Madhya Pradesh, the traditional tasar culture bastion. The power plants and coal mines dotting this region generate lot of waste land which can be utilised for developing tasar plantations under social forestry. The article narrates the success of attempts of the Research Extension Centre of CSB, Katghora, Bilaspur to bring together various industrial units in promoting social and environmental obligations.**

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**Fig. 1. Transplantation work under progress in ash dyke, KSTPP, Korba (1989-90)**

one hand and undertake afforestation under environmental forestry on the other, as corrective measures against environmental damages caused. Sericultural plantations especially tasar are one of the ideal tools for waste land utilisation and generation of plantation wealth. These plantations have long term bearing to check green house emission effect, global warming, depletion of ozone layer and bio-diversity conservations.

The Research Extension Centre of Central Silk Board, Katghora, Bilaspur in Madhya Pradesh has introduced successfully arjun plantation under environmental forestry, since 1989-90. This venture has to meet challenging tasks

of mobilising the industrial units to undertake tasar plantations for supplementing tasar plantation infrastructure on one hand and satisfying the sericulturists of their reservations against the utilisation of silk plantation wealth generated under the environmental forestry. Thus, the centre had adopted an integrated approach to mobilise all the afforestation agencies in the area.

## **Operational area**

Korba being known as the 'Power City of India' is recognised as an industrial belt in Chattisgarh region of Madhya Pradesh falling under the traditional tasar belt. The major industrial units in the area include Korba Super Thermal



**Fig. 2. Nakeel bushes after homogeneous feeding in high voltage transmission belt**

dyke is declared abandoned the wasteland can be utilised.

ii) Over dump area: It is an integral part of open coal mining where dug soil strata is dumped. This is declared abandoned after a definite period and the plantation can be raised to check soil erosion.

iii) Red mud pond area: It is a solid waste of aluminium metallurgical process deposited in ponds.

### Success

**I. Ash dyke plantation:** During 1989-90, the Centre took up experimentation in collaboration with National Thermal Power Corporation (NTPC), Korba by

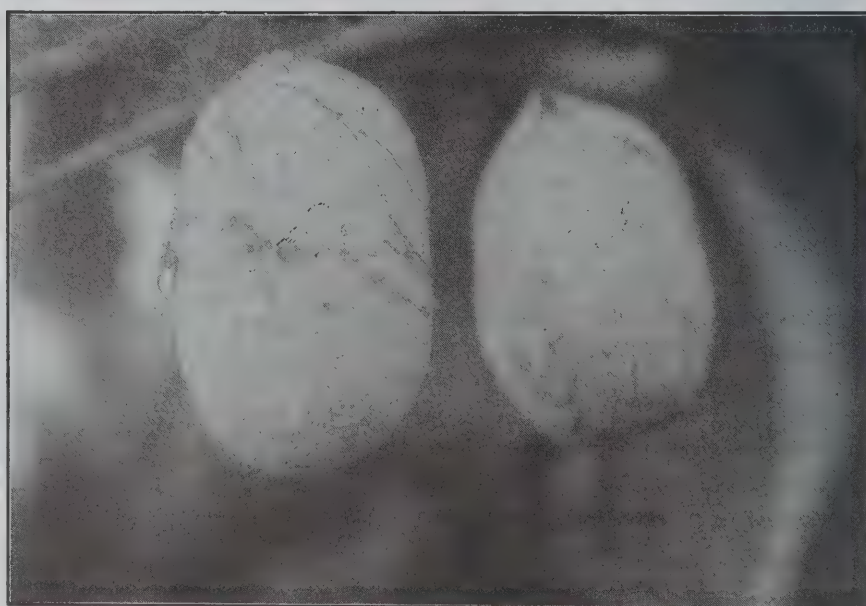
**Table 1 : Experimental rearing details in Ash Dyke, KSTPP, Korba 1991-92**

Crop	Race	Factor	No. of replication	No. of larvae bushed	Larval Wt. (gm)	Larval period (days)	Cocoon harvested			ERR%
							Good	Flimsy	Total	
1st	DBV	Experimental	3	5,000	42.00	32.00	1900	61	1961	39.22
		Control	3	5,000	38.77	32.00	1647	53	1700	34.00
2nd	DTV	Exp.	3	10,000	34.00	35.50	1640	703	2343	23.43
		Control	3	10,000	42.00	37.00	4378	160	4538	45.38
3rd	DTV	Exp.	3	10,000	34.12	84.70	3120	906	4046	40.26
		Control	3	10,000	34.00	83.50	5881	578	6459	64.59

Power Project, (KSTPP), Darri Jamnipali, Balco Power Captive Project, Jamnipali (both under NTPC), Hasdeo Thermal Power Project (HTPP) (under Madhya Pradesh Electricity Board) and the Coal mining complex of South Eastern Coal Field Ltd. and Western Coal Field Ltd. under Coal India Ltd.

Generally, the following processes of thermal power project will lead to formation of wasteland.

i) Ash dykes : It is an integral part of thermal power project where burnt coal ash is deposited in the form of ash water slurry. After operational period, when the



**Fig. 3. Well-formed tasar cocoons**



**Table 2 : Details of grainage performance of tasar cocoons raised in Ash dyke *T. arjuna* bedd. plantation during 1991-92**

Crop	Race	No. of cocoons preserved	Preservation loss	No. of cocoon processed	Pair obtained	Pebrinised rejected	No. of DFLs prepared	Cocoon DFLs ratio	Fecundity range
II.	DBV. Experimental	1900	170	1730	626	65	436	4.35:1	164 - 321
	Control	1900	115	1785	539	42	369	5.10:1	158 - 217
III.	DTV. Exp.	5615	53	5562	1842	381	1152	4.87:1	150 - 190
I.	DTV. Exp.	9100	1231	7869	1739	42	1125	7.3:1	111 - 165
	Control	9100	1405	7695	2192	57	1820	5:1	105 - 184

introducing *T. arjuna* plantation in ash dyke. The basic idea was to explore the possibility of using abandoned ash dyke for raising arjun plantations and to conduct tasar rearing. The farming techniques included:

**System & spacing :** Square system of plantation with 2 x 2 mtrs. spacing.

**Pits :** 2' x 2' x 2'.

**Reclamation** – Pit refilling with media forest soil, Ash, FYM 2:2:1.

**Transplantation** – 2 1/2 months tube seedlings were transplanted during the 1st week of July, 1989.

**Irrigation** : Ash slurry water released in ash cross was utilised for irrigation as and when required.

**Maintenance** : Basal application of FYM after completion of one year, cultural operations taken as ash bed loosening, basin preparation and fertilizer application with dose of nitrogen 10 gm and phosphorus 10 gm through basal application.

The post-plantation results were encouraging as it was ideal for raising tasar crops after two



**Fig. 4. Matured tasar worms**

years with reduction of one year in gestation period. The estimated leaf yield per plant was 3 kg against 1.58 kg in control. (Fig. 1). The plant pest disease infestation i.e., gall infestation (*Trioza fletech* minor); stem borer (*Spheroptora Konabirenses*); plant diseases i.e. powdery mildew (*phyllostictia* sp.) was low due to geographic isolation and non-availability of associable sp.

The experimental rearing trials conducted during 1991-92 in all the three crops on these

plantations indicated that seed crop gave satisfactory result in respect of ERR (39.22%), larval weight (42.5 gm) with shell weight (1.18 gm), cocoon volume (19.86 cc) and cocoon weight 10.93 gm (Table 1). The comparative grainage performance of seed cocoons is depicted in Table-II.

Considering the rearing and grainage trial results, these plantations can be utilised for rearing seed crop and conducting commercial crop grainage.

**II. High voltage transmission belt plantation:** While recommending nursery and plantation technology of arjun plantation under social forestry by Second Forestry Conference (1978) at Dehradun added that vacant land under high voltage transmission belt can also be exploited for raising arjun bush plantation. Hasdeo Thermal Power Project (West), Korba initiated the work in 1989-90 in technical collaboration with the REC, Katghora.

The Centre supplied 15,000 seedlings of arjun and arranged 40,000 seedlings from tasar rearers co-operative society, Korba. The seedlings were transplanted with a spacing of 1.2 x 1.2 mtr. and pit size of 1' x 1' x 1' with soil and @ FYM 3:1.



Fig. 5. Arjun tube seedlings

Watering was ensured along with other agricultural practices and application of NPK @ 100:50:50 per ha. The plantation exhibited homogeneous growth with a gestation period of 2 years (Fig. 2).

The rearing trials in these plantations in three crops are portrayed in Table 3. (Fig. 3).

III. *Overhead dump area plantation*: The Korba power city industrial belt is having abundant over head dump area in the form of artificial hillocks due to dumping of gravel soil accumulation. South Eastern Coal India Ltd., Kusmunda introduced *T. arjuna*

sps. in 1996-97 in these waste lands. The post-transplanting survival and growth was satisfactory keeping in view the soil strata. These plantations have to be assessed for raising tasar crops.

Encouraged by the acceptability of arjun species under environmental forestry, during 1990-91, State Pollution Control Board of Bilaspur took a decision that all industrial units in Korba should take up arjun plantation. Accordingly, Bharat Aluminium Co. Ltd., Bharat Petroleum (Explosive plant) and Coal India Ltd., have undertaken plantation in Kusmunda,

Gevera, Deepika and Lakshman Projects. However, these plantations were taken up in low lying areas, grazing menace could not be checked effectively and scanty patches have come into existence.

Subsequently, as a result of consistent motivation of the Centre, Coal India Ltd., and forest corporation authorities are convinced of having the plantation in general land. During 1997-98, nearly 50,000 seedlings are planted with an ambitious plan to raise a nursery during 1998-99.

### Other plantation

The forest department had also raised 446 hectare of arjun/asan plantation under "Sunishchith Rojgar Yojna" in and around Korba area. These plantations will also help correct the eco-imbalances.

### Conclusion

The success of sericultural plantations in the wasteland of industrial units will have additional benefits like :

(i) Providing employment to land oustees of the project area and promoting traditional cottage based industry.

(ii) To get the credit of doing social welfare for supporting traditional tasar industry for the

Table 3 : Details of rearing conducted in H.T.P.P., Korba

Year of rearing	Crop	No. of DFLs	Race	Date of coupling	Fec. (Avg.)	Date of hatching	Hatching %	Larval wt. (gm)	Larval span (days)
1995-96	3rd	1500	TV	20.10.95 to 4.11.95	210	7.11.95 to 13.11.95	81	37.70	64
1996-97	3rd	676	TV	16.10.95 to 25.10.95	176	25.10.95 to 2.11.95	69	34.3	67
Year of rearing	Cocoon harvested			Cocoon DFL ratio	Cocoon character				
	Good	Flimsy	Total		Cocoon wt. (gm)	Shell wt (gm)	SR%		
1995-96	89700	13800	103500	69:1	11.25	1.48	13.15		
1996-97	39100	3500	42600	63.01:1	10.15	1.19	11.72		



### Why Arjuna species?

The selection of arjun species under environmental forestry was mainly due to following features :

- There is no significant difference in survival rate and economic characteristics of cocoons, when reared in arjun and asan.
- The species can ground well in acidic (pH 4.5 and above) to alkaline soil with pH 8.3-9.7 (Yadav and Singh, 1970, Garg and Khanduja, 1979). Perhaps this ability of the species was the only factor responsible for nearly 40,000 hectare plantation raised all over the country in variable ecological conditions.
- The species respond well to rainfed condition under various agro-climatic conditions. The physiological adaptations of the species near water rich resources enable the plant to establish easily in variable soil stress conditions. The samara fruit, commonly known as seed of arjun requires more water for breaking the seed dormancy and efficient germination and it has nothing much to do for post-transplanting survival and their luxuriant growth.
- Being mesophytic, deciduous, indigeneous plant responding well to monocultural conditions as a fast growing species, it can be more helpful in corrective measures against gaseous pollution. It efficiently converts carbon-dioxide into oxygen. The deciduous nature of species will enable better mineral cycling and organic matter substitution to the soil system. Contrary to popular exotic species like Acacia, Encalytas, Peltaphoerm cassia, samea, cynthea, Kala cesas, australian pine, the arjun species have better social, industrial and environmental obligation meeting capabilities and acceptability.
- The economic value of plant is not only limited to tasar but also utilised in preparation of Ayurvedic medicines, extraction of oxalic acids and efficiently used in leather industry.

local inhabitants.

This self perpetuating message across the districts and state is certainly an outstanding achievement but requires active support by state sericulture department, local administration, pollution

control board and afforestation agencies.

**The author is with CTR & TI, Research Extension Centre, Katghora, Bilaspur, Madhya Pradesh.**

### QUESTION & ANSWER COLUMN

*You may be a student of sericulture or an academician; a sericulturist or a seri-extension worker; an importer or exporter of silk. And, you might have come across baffling situations that are different from the prescribed ones. And, you may be looking for a suitable reasoning. If so, Indian Silk will be the right choice.*

*Indian Silk intends to start a regular Question & Answer column. Your questions will be replied to by the subject specialists. Selected genuine curiosities and problems related to different aspects of sericulture and silk industry with answers will be published, every month.*

*Mail your questions to :  
The Editor,  
Indian Silk,*

# Health Hazards in Sericulture

V.G. Maribashetty, M.V. Chandrakala and K.C. Narayana Swamy

**S**ilk, much known for its splendour, glitter and the natural feel is a saga of human toil, craftsmanship and pursuit for excellence. In fact, the silk industry is not just a single economic system or entity. It encompasses a range of distinct sub-industries, each with its own skilled work force and area of economic operation. Being a labour intensive enterprise, it continues to flourish in labour abundant countries like India and China.

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***Elegance, splendour, grandeur - these are the epithets attributed to silk from time immemorial. But, many processes in different sectors of silk manufacture may cause a few health hazards. The article sheds light on the causes and possible precautionary measures.***

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However, the silk has a glimmering side too. For the majority of the people involved in different sub-industries there is a likelihood of getting exposed to various health hazards. Two major health hazards reported are asthma and skin diseases, though they are not restricted to silk industry alone.

## Allergic disorders

It has been known for a long time that persons engaged in different activities of silk manufacture are at risk to develop bronchial asthma believed to be allergic in nature. Asthma could be triggered by fine scales in the air released by the fluttering of the silk moth. Male silkmoths release more scales as they flutter more frequently during mating. The inhalation of scales can be prevented by wearing masks of three layers of muslin cloth. The presence of exhaust fans in the pairing/oviposition rooms reduces the concentration of scales in the given environment.

Inhalation of fumes during acid treatment of bivoltine eggs and dyeing of silk fabrics using acid baths may cause respiratory disorders. Therefore, care should be taken to avoid inhalation of acid fumes by providing proper exhaust and ventilation facilities in grainages and dyeing units to facilitate quick dispersal of fumes.

In sericulture, formalin and bleaching powder are extensively used as general disinfectants. Use of formalin without certain precautionary measures causes burning of eyes, mucus secretion and peeling of skin. Bleaching powder solution at higher concentration (>50%) causes similar hazards like formalin. Therefore, use of face masks, hand gloves and gum-shoes are suggested during disinfection of rearing room and appliances. The application of dust formulations may cause respiratory disorders and burning of eyes.

During silk reeling, asthma is caused by the smoke emitted from cocoon cooking stoves from the firewood and the stench from steam and vapour arising from fluids released from the pupal body. A few reports regarding the incidence of occupational asthma in sericulture in China and Japan are available. In India, a clinical survey in 1985 involving two silk filatures revealed that 36% of the total workers was suffering from bronchial asthma. It also showed that in 16.9% of the workers, it was only due to the air borne antigens originating from silkworm cocoons and pupae and hence, their suffering is of occupational origin.

During 1987-88 in China, 64 children of less than 15 years of age were reported to have allergic asthma caused by silk which is reported to be a highly potent allergen (Chaoming et al., 1980). These children were exposed to silk quilts and cloths made of silk waste. The allergenicity of fibroin is much weaker than that of sericin. 14% cases of asthma were also accompanied by conjunctivities. Using multi-fuel economic ovens for cooking cocoons eliminates the smoke, a major irritant in the silk reeling room. Hot air drying of cocoons dries up the body fluids of the pupa, thus eliminating the irritant vapours during cooking. A cocoon cooking cage with lid has been designed which minimises vapours and steam from escaping into the room. It is easier to handle and ensures uniform cooking, thus increasing yarn yield.



## Skin disease

The people engaged in silk reeling units are prone to fungal and other skin infections like deramatophytosis (ringworm infection) due to constant immersion of hands during reeling in hot and tepid water. Sometimes, this water is often laced with certain chemicals to improve the colour or quality of silk. The feet also get infected due to constant contact with damp floors caused by improper and unhygienic drainage systems in reeling units.

Since the process of reeling is not fully mechanised, it is difficult to avoid immersing the hands in hot water during reeling and cooking. An antifungal skin ointment to be applied on hands and feet for preventing skin disease and using small forceps to lift or cast out cocoons during reeling could be encouraged which may, however, affect reelability/productivity. As per the advice of silk reeling experts, wearing of gloves all day is not safer as this prevents the hands from aeration leading to fungal disease.

Hence, good ventilation, proper drainage to ensure minimum dampness, use of slippers, regular use of ointments and proper/quick disposal of waste

cocoons would prevent these health problems to a great extent.

## Other hazards

The irrigation of mulberry garden using polluted water with effluents discharged by industries is also harmful to farmers. The concentrated effluents gets deposited on the soil in such gardens. Apart from skin diseases, farmers may suffer from common fever, irritating spasmodic cough etc. Such incidences have been noticed by the authors during survey of sericulturists using polluted water of Vrishabhavathi stream in Bangalore urban district. If use of polluted water for irrigating mulberry cannot be avoided, they may use gum shoes while doing inter-cultural operations.

Several pesticides are used in mulberry gardens to check the incidence of diseases and pests. The use of pesticides cause severe skin burns while preparation of spray solutions and also during the course of application. Therefore, precautionary measures like use of skin protective devices, leak-proof sprayers, glass rod/stick for stirring the liquids, face masks etc., have been suggested.

The people involved in weaving units may encounter certain

problems due to sound pollution. The over-pick and under-pick powerlooms have more beat-up sound which sometimes exceeds 150 decibels. This may induce gradual deafness. However, this problem is not noticed in versatile machines with jet/rapier looms which produce lesser sound. Use of cotton ball to avoid more sound is advisable. People involved in fabric dyeing industries too are prone to certain health problems as they directly deal with the dyes which are basically chemicals and harmful to skin. The azo dyes have been certified as carcinogenic and banned.

Thus, most of these health hazards are directly related mainly to the slackness in the management and ignoring the recommendations in this regard, for various reasons. In simple, if suitable precautionary and preventive measures are taken, many of these hazards could either be avoided or kept to the minimum and there is no reason why sericulture and silk industry should be looked up with apprehensions.

**The authors are with Karnataka State Sericulture Research and Development Institute, Thalaghattapura, Bangalore.**

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## France : Annual Report 1996

### Raw-silk market

**F**rench raw-silk imports showed a slight drop from 434 tons in 1995 to 422 tons in 1996. Imports of silk from Brazil were in first position.

The price increase which affected between October and December 1996, combined with the strengthening of the dollar since that period, can only be a good thing for silk in Europe but the effects would have been greater if they had not happened in a chronically-depressed market both in Italy and France.

France is clearly heading towards an imbalance between the quantities produced and the quantities consumed worldwide. This is not yet too obvious because of the decline of certain large European consumers and because of the existence of certain stocks in the lower grades in China.

Mean time, the situation could become very fragile and unless production increases, which seems highly unlikely, any increase in demand is likely to lead to a shortage, particularly in the higher grades.

### Silk throwing

The year 1996 was a logical follow-up to 1995, and the tonnage handled dropped from 343 to 316 tons.

Silk of Brazilian origin confirmed its competitiveness given that out of 420 tons imported, 206 tons were from Brazil and 202 tons from China. Import and export tonnage of thrown silk were roughly in balance, with 74 tons exported and 84 tons imported.

The market is still being driven by accessories and in particular by the strong image of certain

designer labels.

The image of a luxury product has been seriously damaged by the import of made-up items from China or Hong Kong and by a lack of European Promotion.

Chinese production ought to decline, because of the uprooting of mulberry trees by farmers who consider that cocoon prices are too low. However, this situation is not affecting rawsilk exports, because Chinese domestic consumption is also faltering so that the tonnage available for export to Europe remains adequate.

### Silk weaving

French production of silk fabrics remained practically stable (345 tons in 1996 as against 346 in 1995).

It is worth noting that the silk market, thanks to exports, remains fairly constant. Traditional markets for silk are more difficult and these difficulties are aggravated by currency fluctuations which are affecting the development of sales.

There is increasingly keen competition from Asian countries including the furnishing-fabrics market. However, creativity and innovation promise a brighter future and the chance of creating growth in these markets and in traditional products. The aim is to offer articles with greater originality and innovation. The fashion-trend for 1998 appears reasonably favourable for silk.

### Dyeing, printing and finishing

In 1996, the activity of dyeing, printing and finishing the silk declined as far as garments and accessories are concerned. The overall reduction in volume is

around 5% compared with 1995. The dyeing and printing sector resisted better than printing, which in some cases was as much as 15% down on the previous year.

### Silk-fabric imports

In terms of volume there was a significant cutback: 711 tons in 1996 instead of 913 tons in 1995, i.e. minus 32%. In value terms, the drop was less marked standing at minus 8%. The actual figures were 413 million francs in 1995 and 382 million in 1996.

However, these figures do not reveal a differential developing according to the origins. Fabrics coming from Italy were extremely stable at 319 tons for 248 million francs. Fabrics from India, on the other hand, showed a significant decrease in volume (97 tons compared with 144 tons, minus 32%), and in value, 35.7 million francs against 44.1 million.

The most striking drop however came from China. The volume of imports decreased by 43% (130 tons as against 230 tons) and the value of imports went down 37% from 48.3 million francs to 30.2 million francs. For the first time, the value of silk-fabric imports direct from China was lower than that of fabrics from India.

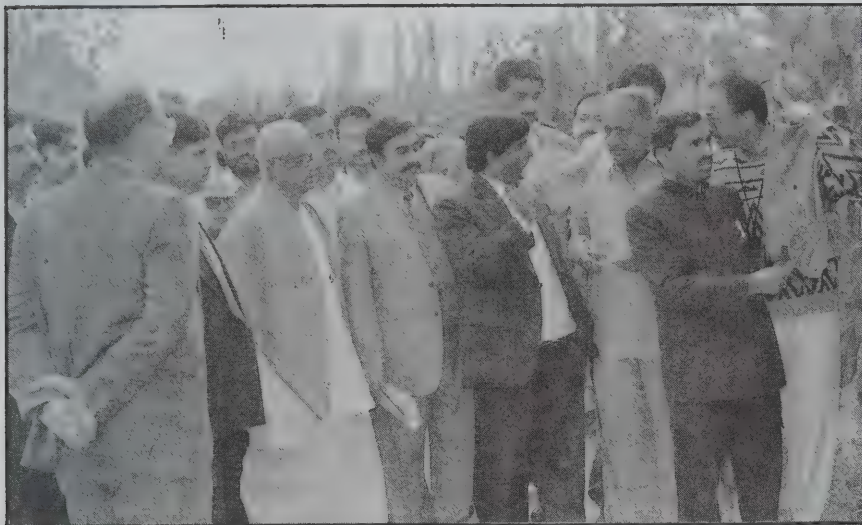
This remark has nevertheless to be put into perspective because of imports of silk fabrics from other countries representing 113 tons and 40,8 million francs. The origin of these fabrics is no doubt China but with a transit, with or without processing, through other countries, notably in Europe.

Imports of silk fabrics from Korea and Hong Kong have also

*(Continued on page 58)*



## Chairman visits CSRTI, Pampore



*Chairman, Member Secretary and other Members of Central Silk Board being apprised of research activities of the Institute*

Shri H. Ekanthaiah, Chairman, Ms. Rukmani Haldea, IAS, Joint Secretary (Textiles) and Vice-Chairman, Shri Arun Ramanathan, IAS, Member Secretary of Central Silk Board accompanied by the Members of Parliament and also other members of the Board visited the Central Sericultural Research and Training Institute (CSR&TI), Pampore, Srinagar, J & K, on 27 and 28th October, 1997.

The visitors were taken around the mulberry farm, laboratories and museum of the institute and apprised of the on-going research and training activities. They evinced interest in the new technique developed by the institute for raising good mulberry genotypes from poor rooters.

The experiment on cultivation of 'Saffron' as an intercrop to make mulberry sericulture more remunerative was witnessed by the visitors. They also met the farmers and had an interaction with them to know their difficulties in practising sericulture.

As a part of the golden jubilee celebrations of India's independence, the Institute arranged a Kissan Mela at its premises on 20th October, 1997. The Hon'ble Minister of Industries & Commerce, Govt. of J & K addressed the gathering and lauded the role of the institute in revitalising the sericulture industry, particularly in J & K and generally in neighbouring states.

**Report: Mir Manzoor Ali, CSR&TI, Pampore, J & K.**

## Trade Exhibition

An Indo-Kuwait Trade Exhibition '97-98 will be held during the second week of February, 1998. Details can be obtained from : Indo-Kuwait Trade Exhibition '97-98  
Deerety Adv. & Exhibition Centre (Commercial Register 49079)  
P.O. Box 44970, Tunis St., Hawalli 32069, Kuwait.  
Fax: 00965 - 2630976.

(Source : Silknet)

## Permanent Display Centre at IIMC, Rotterdam

India International Marketing Centre (IIMC), a trade promotion organisation, was established in 1993 with financial subsidy of the Governments of India and the Netherlands with an objective of providing logistic export marketing support to small and medium enterprises from India to Europe.

In 1995, IIMC created India's first Integrated Marketing Centre in Rotterdam, Holland which is the world's leading port. From this vantage location, the whole of Europe including Central and Eastern Europe, are within the easy reach by different modes of transport.

A wide range of products of nearly 200 Indian companies has been showcased at the Permanent Display Centre which serves as a 'Show Window' for the products in Europe. The Rotterdam office invites the European buyers to the Centre periodically and their interest in the products is immediately transmitted to the companies concerned.

IIMC also offers most modern warehousing facilities and excellent opportunities for value addition by packing, repacking, labeling, assembly, sorting and invoicing of the products.

For further details, contact  
M.S. Azaad,  
Chief Executive, Coordination  
India International Marketing  
Centre, H.O. K-7, Green Park  
Extension, New Delhi-110 016.  
Tel - 696/2217, 2504, 6086,  
6858327  
Fax: 011-686 7571  
e-mail: india. iimc @ gems. vsnl.  
net. in.



## Context India '97 concludes



Shri L.N. Jhunjunwala, Chairman, Emeritus, LNJ Bhilwara Group, inaugurated the three-day trade show - Context India '97 - at Bombay Exhibition Centre, Goregaon, Mumbai on October 24, 1997.

Shri Jhunjunwala emphasised the need for greater interactions

between the textile producers on one side and garment manufacturers on the other, so that the final products remain competitive, relevant and command the premium. He also spoke of the need to focus on high value additions to design inputs as well as market intelligence.

Shri Raju Goenka, Vice Chairman, Apparel Export Promotion Council, highlighted the Indian garment industry's capabilities in meeting the emerging challenges especially arising out of multi fibre agreement/WTO compulsions.

This year Context India attracted over 150 exhibitors from 16 countries suggesting an enthusiastic response from the Indian and overseas industry representing a number of textile dominant countries such as Taiwan, Japan, France, Australia, Hong Kong, Dubai, Korea, Singapore, etc. They have displayed their latest innovations in fabrics, fibres, yarns, trimmings, embellishments and CAD/CAM systems.

A major highlight of the show, which ended on October 26, 1997 was the involvement of Promo Style, Paris alongwith Clotheshine group in developing trend information for the domestic market.

A host of well-known designers such as Ritu Beri, Bhamini Subramaniam, Bhairavi Jaikishan, Salim Asgarally, Rocky S, Khorshed Panthaky, Meena Ganeriwal and Ankur Jain were actively involved in developing collections for summer '98 for the domestic market.

Looking to the importance of trend correct products being supplied to the growing international markets, Trend Forecast for Autumn/Winter '98-99 were researched and previewed with the involvement of a host of designers from Ritu Beri Fashion Fraternity.

Context India '98 is scheduled to be held at Mumbai from November 6-8, 1998.



*A view of the glittering fashion show*

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## Resham Mela in Varanasi



*Divisional Commissioner and Dist. Collector being briefed about the importance of Bivoltine Silk*

A nine-day 'Resham Mela' was organised at Varanasi in Uttar Pradesh from November 10-18th, 1997 which was inaugurated by Shri N.S. Napchyal, IAS, Divisional Commissioner, Varanasi on November 11, 1997.

A 'Silk Stall' was put up by the State Sericulture Department with the active support of the Purvanchal Sericulture Development Project (PSDP), Central Silk Board, Varanasi.

Shri B. Singh, IAS, Dist. Collector, Varanasi visited the stall and appreciated the presentation. The Divisional Commissioner underlined the importance of promoting sericulture as a cottage

industry for the benefit of villagers. UPICA, U.P. Small Scale industry department, K.G.H. and silk dealers participated in the programme.

Shri S.B. Saraswat, Deputy Director, PSDP, and Dr. O.P. Singh, Assistant Director, DOS, explained the benefit of sericulture to the visitors.

The Divisional Commissioner issued a certificate as a token of appreciation for the 'Silk Stall'. The Dist. Collector graced the valedictory function and stressed the role of sericulture in bringing prosperity to the rural population.

**Report: S.B. Saraswat, Deputy Director, PSDP, Varanasi, UP.**

## Silk Exhibition at Bangalore

The Union Ministry of Textiles has decided to organise an 'Integrated Silk Exhibition' at Bangalore from 15-25th December, 1997. The complete story of silk from "cocoon to wide ranging fashionable end product" will be focussed on the occasion. The exhibition will have stalls displaying exquisite silk products and also

providing useful information about the sector.

The Indian Silk Export Promotion Council (ISEPC) has been entrusted with the task of mobilising exporters participation. Since the exhibition will provide an opportunity to the exporters to showcase a wide range of products, interested exporters may

## Inter Textile— Setting New Records

The third Intertextile - China International Trade Fair for Apparel Fabrics, Home Textiles and Accessories - held in Shanghai from 27-29th October, 1997, has set a new record with 9,100 trade visitors and 352 exhibitors from all over the world.

Full aisles and lively sales and information talks were the distinguishing features of the three-day event during which a number of orders were placed.

The exhibitors were satisfied with the professionalism and number of trade visitors. In both garment and home textiles, the focus of buyer's interest was on high-grade brand name products in the middle to upper price segments clearly indicating the Chinese buyers' willingness to spend more money on good quality products.

A multifarious programme of trend forums, fashion shows and seminars rounded off the overall picture of the intertextile as a working and information fair.

The intertextile is a joint venture of Messe Frankfurt, the China Textile International Exchange Centre and the sub-council of textile industry (CCPIT) and supported by the China National Textile Council.

The next Intertextile will be held at the INTEX Exhibition Centre in Shanghai from 27-29th October, 1998.

contact National Handloom Development Corporation Ltd., 10 & 11th Floors, Vikas Deep, 22, Station Road, Lucknow-226001 (Fax 0522 - 248075) who is the nodal agency to organise the event.

*(Source: Silknet)*

## Unit Cost of Sericulture

The Unit Cost for Sericulture as on 31-10-97, as advocated by the Regional Offices of National Bank for Agriculture and Rural Development (NABARD) for Gujarat and Maharashtra is as follows

<u>Gujarat</u>	<u>Amount (Rs.)</u>
Cost of raising mulberry plantation, production, maintenance and labour cost.	8,032.00
Cost of rearing equipment	17,000.00
Rearing house cost (32'x16')	38,400.00
Cost of Dfls (multivoltine race)	800.00
Other expenses in rearing	930.00
	<hr/> 65,162.00
	Say Rs. <hr/> 65,000.00

### Maharashtra

Cost of raising of mulberry (1 acre model) production, maintenance and labour cost.	5,000.00*
Cost of rearing equipment for 300-400 Dfls reared on mulberry leaves. (This loan is to be repaid in half yearly instalment within a period of 3 years + 11 months grace period.)	10,000.00
Cost of pucca rearing house of 375 sq. ft.	24,000.00*
	<hr/> 39,000.00

\*This loan is to be repaid in half yearly instalment within a period of 4 years + 11 months grace period.

Note : Before financing for pucca rearing house, Financing Bank to ensure that the beneficiary is raising mulberry plantation at least of one acre land.

Compiled by : J.F. Pahurkar, Joint Secretary (Tech.) RO, CSB, Mumbai.

## Internationality at Interstoff Asia

The tenth Interstoff Asia Autumn brought an all time high of 497 exhibitors from 26 countries to the Hong Kong Convention and Exhibition Centre for the three-day trade fair from 15-17th October, 1997. 11,500 trade buyers from 77 countries came to the fair pushing the internationality of the event to 30%, underlining the importance of Interstoff Asia as the apparel textile marketing platform from the Asia - Pacific.

Over 90% of exhibitors came from outside Hong Kong. India, Taiwan, Italy, France and Hong Kong were the five strongest exhibitor nations in terms of quantity.

Messe Frankfurt has organised Interstoff Asia since 1987. It is not only popular among Asian designers and clothing manufacturers but also European and American companies.

Messe Frankfurt celebrated Interstoff Asia's tenth anniversary with special fashion shows featuring the German design team, Pompoos, who transformed exhibitor textiles into extravagant outfits for men and women. Trend information was showcased in the Interstoff Asia Trend Forum, where yarn and colour directions for Autumn/winter 1988-99 were displayed.

### Dates for 1998

Interstoff Asia spring  
April 1-3,

Interstoff Asia Autumn  
October 21-23.

Venue: Hong Kong Convention  
and Exhibition Centre

For further exhibitor or visitor  
information, contact :  
Messe Frankfurt GmbH



Ludwig-Erhard-Anlage-1  
60327 Frankfurt,  
Germany  
Tel. 49(69) 7575-6961  
Fax 49(69) 7575 - 6604  
e-mail:

Overseas-exhibition@  
messefrankfurt. de  
Ms. Pefra Grigert

Messe Frankfurt Hong Kong Ltd.,  
1809, China Resources Building,  
26, Harbour Road,  
Wanchai, Hong Kong  
Tel: (852) 2802-7728  
Fax: (852) 2511-3466  
e-mail: mfhkfair @ netvigator. com)  
Ms. Katy Lam

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## Eco-testing laboratory at Ichalkaranji

Shri Deepak Sheti, Additional Textile Commissioner, Union Ministry of Textiles, inaugurated recently the Eco-testing laboratory at the premises of Ichalkaranji Powerloom Weavers' Co-op. Association.

Shri Sheti said that the laboratory set up by the Bombay Textile Research Association (BTRA) with the financial support from the Union Ministry of Textiles would assist the powerloom fabric manufacturers in improving the quality to meet the international standards and to scale new heights in exports.

Dr. B.N. Bandyopadhyay, Director, BTRA, hoped that the laboratory would provide vital testing facilities conforming to eco-standards and bridge the lacunae.

Shri Dhanpal Tare, Chairman, Powerloom Development and Export Promotion Council (PDEXCIL) stressed the need for upgradation of the machinery technology and quality of powerloom and process-

ing sectors for domestic and international markets. Shri M. Nimankar, President, Ichalkaranji Powerloom Weavers' Co-op. Association called upon the powerloom owners to make full use of the eco-testing facility.

An awareness programme on eco-testing was also organised by BTRA for the benefit of the participants numbering over 100.

(Source : Clothesline)

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## International Menswear Fair

The 1998 edition of International Menswear Fair will be held in Cologne from 6-8th February, 1998. Every year the companies in the haute couture trade share a common date in their calendars - three days each at the biannual event and it is an indispensable platform for India.

The fair will be presenting an exhaustive range of men's clothing including sportswear, clubwear, sports fashion, denim, etc. and Cologne provides a singular platform to meet and witness the talent behind the world's most well-dressed men.

With the fairs ideally timed to suit the spring and autumn orders, the tradeshow cater to all kinds of garments and has gained a reputation of being the world's top trading place for men's clothing industry.

(Source : Clothesline)

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## Texpression '98

Texpression '98 will be organised at the National Institute of Fashion Technology (NIFT), New Delhi from February 12-13, 1998.

Organised by the Department of Textile Design and Development, the primary objective is to highlight the issues and challenges

being faced by the global textile industry, in general and the Indian textile industry, in particular.

The event will be the fourth annual conference which will bring together speakers and delegates from the field of design, industry and education and also to build bridges throughout the supply chain.

The delegate profile will have a fair representation of fashion and textile designers, manufacturers, managers, exporters, scientists and the academicians, representatives of Ministry of Textiles, Export Promotion Councils and NGOs will also be attending the event.

(Source : Clothesline)

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## Tex-Styles India '98

Tex-Styles India '98, an ideal forum for display of a spectrum of fabrics, home furnishings and accessories, etc., will be held at Pragati Maidan, New Delhi from 29th January to 1st February, 1998.

India Trade Promotion Organisation (ITPO), the organizer of the trade fair, has decided to make the ensuing event more professional. The India International Garment Fair and Indian Handicrafts and Giftware Fair will also be held concurrently to enable the buyers to source their products from the fairs.

Now in its fourth year, the Tex-styles India fair is where one can meet the 'who's who of the textile industry', where fabrics, fashion design and technology play gallery to the creative minds.

Over 10,000 buyers from 75 countries will come down to Pragati maidan to discover the riches of silk, cotton, woollens and man-mades.

India's leading fashion school NIFT will creatively design and prepare a theme pavilion for this prestigious fair on textiles. The trend forum will help analyse the looks for Fall winter '98/99 and Spring Summer '99 while fabric folio section will take into the future to assess the fabric looks, designs and techniques likely to be vogue in the year 2000. A style and Trend show that will anticipate the fabrics and colours of the season in India and abroad is also planned. The event will be promoted through a multi media publicity campaign to ensure an impressive participation.

The third Tex-styles India Fair which concluded on 31st January, 1997 was a resounding success in terms of business and impressive buyer turnout – over 1500 overseas buyers from 73 countries besides 450 buying agents. The fair has come to be recognised as a premier textile event and has been compared with leading international textile fairs like Interstoff, Premier vision, Heimtextil, etc.

*For more details, contact:*

The General Manager (TDMD)  
India Trade Promotion  
Organisation  
Pragati Bhawan, Pragati Maidan,  
New Delhi-110 001.  
Fax: 91-11-331-8142/7896  
(Source : *Hosiery Report*)

## World textile consumption up

Between 1985 and 1995, the world fibre consumption has increased from 32.7 m tons to an estimated 41.4 m tons. The fastest growth was in developing countries. In East and South East Asia, consumption per head increased by over 80% in ten years.

Nonetheless, consumption per head in developing countries remained only one-fifth of the level in western developed countries.

At the mill level, fibre usage in Western developed countries and Japan continues to stagnate, as the developing countries share increases rapidly. Nearly half of the world's primary fibre processing now takes place in China, South Asia, and East and South East Asia. In contrast, western developed countries and Japan account for less than one third of the world total.

(Source : *Clothesline*)

## ENVITEC '98 in Dusseldorf

The International Trade Fair for Environmental Production and Waste Management Technologies (ENVITEC) will be held in Dusseldorf, Germany from March 2-6, 1998. The event will be the next year's prime showcase for environmental and waste management systems.

Until a few years back, environmental protection meant reprocessing, recycling and so on. But today's ecological thinking unites on-stream technology with treatment technology. Caring for our planet now means more than collecting, sorting and recycling – it is an integral part of production and development.

At ENVITEC '98 about 1,200 companies will showcase both traditional and new technologies to trade visitors from all over the globe.

The exhibit list includes the established categories—waste management and recoverable waste recycling, contaminated site clean-up and soil treatment, water, wastewater and sludge treatment, air pollution control, noise abatement/insulation, measuring, con-

trol and analysis systems and services. The new category includes alternative energy production processes using treated waste, waste air and waste water, plant and processes for harnessing biomass, geopower, solar energy, water and wind power and dump gas.

Exhibitor numbers have risen steadily since the event was staged in 1973. The first ENVITEC drew 360 companies, participation while it is expected that the forthcoming event will attract about 1,200 companies' involvement. The number of trade visitors has also been surging. The last staging drew 51,200 visitors from 59 countries.

ENVITEC '98 will look at eco-care and waste management systems of both today and tomorrow. The main target groups are the energy sector, industry, trade, commerce and services.

'Eco-efficiency as Environmental Management Goal' is the theme of the ENVITEC '98. International conference to take place on March 2 & 3.

The German plant and machinery, with its technological edge, is best placed to provide cost-effective solutions besides setting new standards in care and protecting the environment. The sector offers a wide range of equipment and processes that combine advanced technology with economical performance.

ENVITEC '98 explores the vital technologies for maintaining and enhancing the quality of our lives. Here, professionals find expert partners with customised solutions for each and every aspect of environmental care and waste disposal.

*For details:*

Indo-German Chamber of Commerce,  
Maker Tower E, First Floor,  
Cuffe Parade, Mumbai-400 005  
Fax: 222180523  
(Source: *Indian Textile Journal*)



## 'Monograph on silkworm loose egg production'-

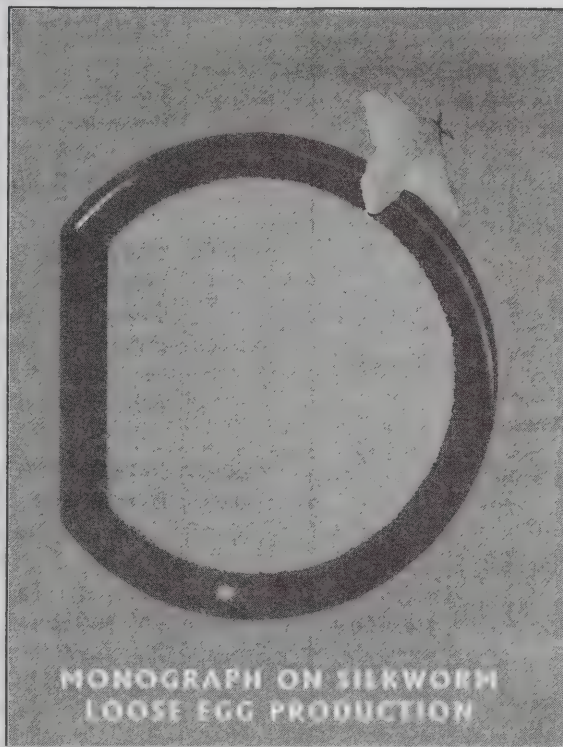
### *Making the loose ends meet*

**O**f the many factors that decide the success of sericulture, production and handling of quality silkworm seed top the list. Presently, the silkworm seeds are produced either on paper cards or in loose form. India has been adhered to card egg production all these years. Only recently, it is shifting to loose egg production. While, loose egg production has relatively a long and often honourable past in sericulturally developed countries, its acceptance and adoption are being picked-up slowly in India.

Ever since,, the loose egg concept has taken a definite shape in our country, it has not become a headline news as expected, because it was not viewed as something explosively new, but as a continuation of a process albeit a system with few apprehensions! But, in reality it is not so. The very fact is evident in the success of countries like China and Japan.

Apparently, there appeared to be a few apprehensions among producers / consumers about this 'new' system initially. Adding to it, lack of appropriate and well-defined technique/know-how and suitable equipments have marred its wider acceptance and popularity.

To address such problems, and also to meet the growing demand on the part of sericulturists for the authentic and up-to-date information about loose egg production, Silkworm Seed Technology Laboratory (SSTL) of Central Silk Board, Kodathi, Bangalore has



developed a package of know-how and standardised various steps of loose egg production. It also fabricated equipments to suit our conditions, thanks to the Bivoltine Sericulture Technology Development Project (BSTDP) sponsored by Japan International Co-operation Agency (JICA). The result is the "Monograph on Silkworm Loose Egg Production", authored by Dr. M.V.Samson, Dr. Chandrasekharaiah, Dr. Puttaswamy Gowda and Shri Biram Saheb.

Evidently, the tough part of loose egg production is to make it universally acceptable-both to egg producers and consumers. It is difficult to accept any sudden change especially in a traditional craft like sericulture. Farmers are used to card system for decades and for a change-over, they need to be persuaded, convinced about

the new system and the advantages/benefits it brings in. Consistent extension efforts blended with suitable and effective publicity measures would only yield desirable results.

The publication discusses mainly the advantages, equipments and most importantly the production process covering the preparation of egg sheets, oviposition, collection of loose eggs, degumming of eggs, drying of eggs, acid treatment of bivoltine eggs, winnowing of eggs, elimination of undesirable eggs, packing standards and brushing of loose eggs.

The authors have expressed their considerable gift of clear exposition and the book deserves to be widely read at the present vital cross-roads in the technological history of egg production. One of the striking features of the publication is the colourful photographic depiction of the stepwise process involved, which presents the scientific facts with great ease and artistry. Anyone who reads this 25 page monograph of 1/4 crown size with good and clear printing will have a better picture of loose egg production technology. Its reasonable price also makes it an attractive buy.

For copies write to:

The Director  
Silkworm Seed Technology Lab.  
Central Silk Board  
Carmelram Post Kodathi  
Bangalore - 560 035.

**Mukund V. Kirsur, Indian Silk,  
Central Silk Board, Bangalore.**

# Textile Trade Fairs – 1997–98

Date	Exhibition	Place
	<b>INDIA</b>	
1997 Dec 04-07	<b>Interstyle India-Garment Tech</b> Garment Machinery and Accessory Venue : Bombay Exhibition Center, N.S.E. Complex Contact : ANZ Int'l Trade & Marketing Associates Chennai – 600068 Ph : 8283575 Fax: 91-044-8259552	Mumbai
05-09	<b>KNIT-TECH '97</b> Knitting Technology and Services Venue : Ramasamy Muthammal Thirumana Mahal Contact : Hi-Tech Trade and Technical Consultants Ph : 710092, 714604 Fax: 91-421-473545, 700752	Tirupur
1998 Jan 29-31	<b>INDIA INTERNATIONAL GARMENT FAIR '98</b> Garments Venue : Pragati Maidan Contact : A.E.P.C. Ph : 6169394/9356/57 Fax: 91-11-6168584	New Delhi
Mar 26-29	<b>GARTEX '98</b> Garment Machinery, Textiles & Accessories Venue : Pragati Maidan Contact : Modern Multi Media Mktg. Co. (India) Pvt. Ltd. Ph : 5704450/4234 Fax: 91-11-5700644/2138	New Delhi
	<b>OVERSEAS</b>	
1997 Dec 02-04	<b>MODA PRIMA</b> Clothing and Knitwear Contact : SVIP Ph : 89010020 Fax: 39-2-89010345	Milano Italy
02-04	<b>EXPOFIL</b> Yarns Contact : Expofil, 92113, Clichy Cedex Ph : 48206364 Fax : 33-1-48203566	Paris France

Date	Exhibition	Place
02-05	<b>MYANMAR TEXTILE AND GARMENT MACHINERY EXPO</b> Textile and Garment Machinery Contact : CP Exhibitions China Promotion Ltd., Wanchai Ph : 25117427 Fax : 852-25119692	Myanmar Burma
02-08	<b>SIMATEX</b> Fashion and Textile in Africa Contact : CICES BP 8166 ou 3329, Dakar Ph : 201011 Fax : 221-204605	Senegal Africa
1998 Jan 10-13	<b>INTERNATIONAL FASHION BOUTIQUE</b> Apparel, Accessories and Jewellery Venue : Javit Convention Centre Contact : The Larkin Group NY 10018 Ph : 5940880 Fax : 1-212-5948556	New York U.S.A.
11-13	<b>INTERNATIONAL KIDS FASHION</b> Childrenwear Venue : Javit Convention Centre Contact : India Trade Promotion Organisation Ph : 3371601/3319482 Fax : 11-3318142/7896	New York U.S.A.
15-18	<b>HONG KONG FASHION WEEK</b> Fabrics, Ready-to-wear, Accessories Venue : Hong Kong Convention and Exhibition Centre Contact : Hong Kong Trade Development Council Ph : 25844333 Fax : 852-28240249	Hong Kong Wanchai
17-19	<b>PROGETTO INTIMO</b> Underwear and Lingerie Contact : Fiera de Milano, 20126 Milano Ph : 66103820 Fax : 939-2-66103844	Milan Italy



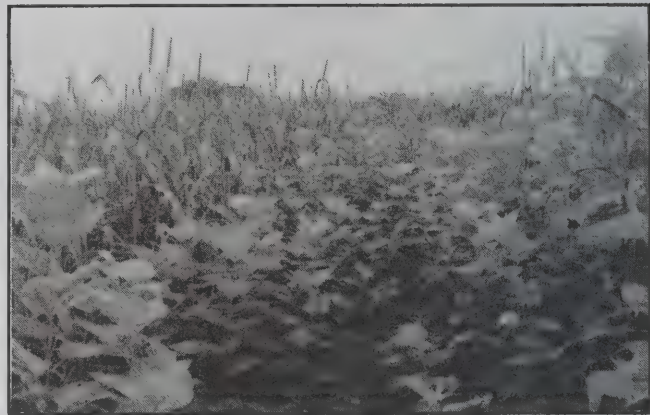
# Trade Enquiries

Sl. No.	Importers	Interested in
1.	A.H. Sami Est. P.O. Box 6756, Dammam Riyadh, Saudi Arabia Tel : 8345465 Fax : 8345465	Textiles
2.	M/s. G.L. Trading Enterprise P.O. Box 1471, ADDIS ABABA (ETHIOPIA)	Textiles and Ready Made Garments etc.
3.	M/s. Sunlight Industrial & Distribution Company P.O. Box 1286, ADDIS ABABA (ETHIOPIA) Tel : 00251-1-712311 Fax : 00251-1-712400	Textile Processing
4.	Jowar Al Harbi P.O. Box 21295, Riyadh, Saudi Arabia Tel. : 4217605 Fax : 4217605	Textiles
5.	M/s. Saleh M. Hamadah Sons Trading Co. P.O. Box 2179, Jeddah-21451, Saudi Arabia Tel : 6650780 Fax : 6651462	Readymade garments
6.	Mr. Gulam Khajei Mohiuddin P.O. Box 16886, Jeddah-21474, Saudi Arabia Tel : 6443046	Readymade garments/Hosiery
7.	Mr. Adil Ali P.O. Box 20126, Madinah, Saudi Arabia Tel : 8213061 Fax : 8474334	Readymade garments
8.	M/s. SWAD Int'l P.O. Box 20455, Jeddah-21455, Saudi Arabia Tel : 6482605/6483454 Fax : 6482800/6482605	Garments
9.	M/s. Al-Khadra Ind'l. Est. P.O. Box 13504 Jeddah-21414, Saudi Arabia Tel : 6729768 Fax : 6743892	Readymade garments
10.	M/s. Khalid M. Al-Suney Est., Jeddah-Ghernata Centre Jeddah-21493, Saudi Arabia Tel : 6702395 Fax : 6702395	Textiles

# पूर्वांचल में रेशम उत्पादन एवं परम्परागत कृषि - एक अध्ययन

आर.के. पाण्डे, गार्गी, प्रदीप शुक्ला, आर. कुमार एवं सत्यभान सारस्वत

**पू**र्वी उत्तर प्रदेश में प्रमुखतः गेहूँ, धान, आलू, गन्ना, अरहर, सरसों एवं बाजरा की खेती की जाती है। किन्तु, इस क्षेत्र में कम उत्पादकता के कारण इसका समुचित लाभ नहीं मिल पाता है तथा अधिकांश कृषक गरीबी-रेखा से नीचे जीवनयापन कर रहे हैं। पूर्वांचल में परम्परागत कृषि से होनेवाली आय का विवरण तालिका-1 में दर्शाया गया है। इस क्षेत्र में गेहूँ एवं धान के फसल-चक्र से प्रति एकड़ रू. 15643 की वार्षिक आय होती है।



परम्परागत बाजरा की पृष्ठभूमि में शहतूत की सघन कृषि

**फसलों में खाद्यान्न के महत्व को इसकी आवश्यकता के संदर्भ में उपेक्षित नहीं किया जा सकता। किन्तु क्षेत्र विशेष में किन्हीं कारणों से इनकी निम्न उत्पादकता एवं फलतः कृषक के अथक प्रयास के बावजूद निम्न लाभ के दृष्टिकोण से पूरे वर्ष के दौरान चार फसलों से रेशमकीट पालन से प्राप्त आय निश्चय ही आकर्षक है। पूर्वांचल में परम्परागत कृषि एवं रेशमकीट पालन से प्राप्त आय के तुलनात्मक अध्ययन पर आइये डालें, एक नज़र।**

केन्द्रीय रेशम बोर्ड के वाराणसी स्थित अनुसन्धान प्रसार केन्द्र ने प्रतिवर्ष चार रेशमकीट फसलों का प्रदर्शन कर इस क्षेत्र के कृषकों के लिए व्यावसायिक कृषि को एक नई दिशा दी है।

## शहतूत की सघन कृषि

पूर्वांचल में रेशम उत्पादन से अधिक लाभ प्राप्त करने के

लिए कम से कम एक एकड़ खेत में शहतूत की उन्नत किस्मों जैसे कन्वा 2, एस 1635 एवं एस 146 के 5445 पौधों का रोपण सघन कृषि के लिए दो कतारों के बीच चार फीट एवं दो पौधों के बीच 2 फीट की दूरी रखते हुए किया जाता है।

सघन कृषि से सिंचित अवस्था में प्रतिवर्ष 10000 किग्रा शहतूत पत्ती एवं इससे कीटपालन कर प्रति एकड़ 325 किग्रा कोसों का उत्पादन किया जा सकता है। शहतूत को झाड़ी के रूप में रखने के लिए वर्षा ऋतु के प्रारम्भ (जुलाई माह) में जमीन से एक फूट की ऊंचाई पर एवं शरद ऋतु (नवम्बर) में जमीन से दो फीट की ऊंचाई पर मुख्य तने को काट दिया जाता है।

शहतूत बागान को प्रति सप्ताह एक इंच एकड़ पानी की आवश्यकता होती है जिसकी आपूर्ति वर्षा से, अन्यथा सिंचाई से की जाती है। शहतूत बागान में प्रति एकड़ प्रति खुराक 118 किग्रा रासायनिक खाद भी डालना आवश्यक है जिसमें 44 किग्रा यूरिया, 63 किग्रा सिंगल सुपर फास्फेट एवं 12 किग्रा म्यूरेट ऑफ पोटाश होता है। यह खुराक कीटपालन से 20 दिन पूर्व खेत में डाली जाती है। साथ ही, खेत को उपजाऊ बनाये रखने के लिए वर्ष में एक बार 8 मेट्रिक टन गोबर जैसी घरेलू खाद भी वर्षा ऋतु के प्रारम्भ में डाली जाती है।



रेशमकीट वातावरणीय तापक्रम एवं आर्द्रता के प्रति बहुत संवेदनशील होते हैं। इन पर विशेष ध्यान देते हुए पूर्वाचल में चार फसलें ली जाती हैं।

## द्विप्रज संकर कीटपालन

द्विप्रज रेशमकीट पालन वसंत एवं पतझड़ में किया जाता है। इस क्षेत्र में द्विप्रज संकर एस एच 6 x एन बी<sub>4</sub>डी<sub>2</sub> से प्रति 100 अण्ड समूह 50 किग्रा कोसे प्राप्त किये जाते हैं। कृषक स्तर पर प्रति एकड़ 125 अण्ड समूहों से वसंत में 63 किग्रा एवं पतझड़ में 175 अण्ड समूहों से 92 किग्रा द्विप्रज कोसों का उत्पादन किया जा सकता है।

## द्विप्रज और बहुप्रज संयोजित वर्षा संकर

ग्रीष्म में अधिक तापमान एवं कम आर्द्रता तथा वर्षा ऋतु

तालिका 1: पूर्वाचल में विभिन्न फसल-चक्रों से प्रति एकड़ वार्षिक आय						
खरीफ			रबी			कुल वार्षिक आय (रू.)
फसल	उत्पादन (क्विंटल)	कुल आय (रू.)	फसल	उत्पादन (क्विंटल)	कुल आय (रू.)	
धान	20	7902	गेहूँ	16	7741	15643
धान	"	"	सरसों	6	6000	13902
धान	"	"	चना	7	7000	14902
बाजरा	14	4900	गेहूँ	16	7741	12641
बाजरा	"	"	चना	7	7000	11900
बाजरा	"	"	आलू	125	12500	17400
गन्ना	245	18130	—	—	—	18130
			अरहर	6.5	6500	6500
वर्ष में चार रेशमकीट पालन से कुल आय						22750

में अत्यधिक आर्द्रता के कारण, इन मौसमों में द्वि और बहुप्रज वर्षा संकर जैसे, ग्रीष्म में निस्तरी x एन बी<sub>4</sub>डी<sub>2</sub> एवं वर्षा में

तालिका 2: पूर्वाचल में रेशमकीट पालन के लिए उपयुक्त मौसम, रेशमकीट प्रजातियाँ एवं उत्पादकता

मौसम	कीटाण्ड प्रस्फुटन तिथियाँ तथा प्रति एकड़ अंड समूहों की मात्रा	रेशमकीट संकर	कोसा उत्पादकता प्रति एकड़ (किग्रा)
वसंत	फरवरी, 10-15 (125)	एसएच 6 x एनबी <sub>4</sub> डी <sub>2</sub>	63
ग्रीष्म	अप्रैल, 1-3 (150)	निस्तरी x एनबी <sub>4</sub> डी <sub>2</sub>	58
वर्षा	अगस्त, 15-20 (175)	पी एम x एनबी <sub>4</sub> डी <sub>2</sub>	112
पतझड़	अक्टूबर, 10-15 (175)	एसएच 6 x एनबी <sub>4</sub> डी <sub>2</sub>	92

पी एम x एन बी<sub>4</sub>डी<sub>2</sub> का पालन किया जा सकता है। अनुसन्धान प्रसार केन्द्र द्वारा प्रदर्शित किया गया है कि कृषक द्वारा ग्रीष्म में 150 अण्ड समूहों से प्रति एकड़ 58 किग्रा एवं वर्षा में 175 अण्ड समूहों से 112 किग्रा कोसे प्राप्त किये जाते हैं (तालिका-2)।

इस प्रकार, रेशमकीट पालन से वर्ष में चार फसलों से प्रति एकड़ 325 किग्रा कोसे प्राप्त कर औसतन रू. 70 प्रति किग्रा के बाजार भाव से, रू. 22750 की कुल आय प्राप्त की जाती है। पूर्वाचल में शहतूत बागान में रासायनिक खाद एवं कीटाण्ड पर रू. 3000 के वार्षिक रेशमकीट पालन से व्यय के पश्चात् लगभग रू. 20,000 की शुद्ध वार्षिक आय प्राप्त की जा सकती है।

स्पष्टतः, रेशमकीट पालन से प्राप्त वार्षिक आय पूर्वाचल में होनेवाली अन्य फसलों की तुलना में अधिक है (तालिका-1)। इस क्षेत्र में, रेशमकीट पालन से होनेवाली आय, गन्ना एवं आलू जैसी नगदी फसलों से प्रतिस्पर्धी है।

लेखकगण पूर्वाचल रेशम विकास परियोजना, केन्द्रीय रेशम बोर्ड, वाराणसी में कार्यरत हैं।

## आपके विचारों का स्वागत है

देश में रेशम उत्पादन एवं उद्योग के किसी पहलू के संबंध क्या आप कुछ कहना चाहते हैं ? कृपया संपादक को निःसंकोच लिखें। इंडियन सिल्क में प्रकाशित लेखों के अतिरिक्त, रेशम उत्पादन के किसी भी पहलू पर आपकी प्रतिक्रिया का स्वागत है।

# ओक तसर रेशमकीट में बैक्टीरियल रोग एवं नियंत्रण के उपाय

हरीश चन्द्रा

**भारत** में ओक तसर रेशम का उत्पादन देश के वैज्ञानिकों के अथक प्रयासों के फलस्वरूप वर्ष 1970 में ओक तसर रेशमकीट की नई प्रजाति *एन्थैरिया प्रोयली* के साथ प्रारम्भ हो सका जो कि *एन्थैरिया रोयली* व *एन्थैरिया पैरनी* के मध्य एक अन्तर्प्रजातीय संकर नस्ल है (जौली व अन्य, 1969)।

ओक तसर रेशम उत्पादन के सूत्रपात के उद्देश्य निश्चय ही महत्वाकांक्षी थे किन्तु, ओक रेशमकीट की कुछ अन्तर्निहित कमियाँ, रेशमकीटों की भांति विभिन्न रोगों के प्रति संवेदनशील होना तथा अभी तक व्यावसायिक स्तर पर घरेलू कीटपालन करने में सफलता करने में सफलता न मिलना इस उद्योग की गंभीर समस्याएं हैं। यह कीट मुख्यतः बैक्टीरिया, वायरस एवं

हो जाना, और मलाशय का बाहर आ जाना।

विवरणात्मक रूप से सभी लक्षण *एन्थैरिया माइलिट्टा* के समरूप होते हैं (सेन व अन्य (1969), चन्द्रा व सिंह (1994) तथा चन्द्रा (1997) ने बैक्टीरियल रोग के कुछ अन्य लक्षणों का पता लगाया है जो *बैम्बिक्स मोरी* के समरूप हैं (सैमसन, 1995): ब्लैक थोरेक्स एवं रैड सेप्टीसैमिया, तथा सौटोटाइप रोग, शरीर में सिकुड़न व कमजोरी, एवं दस्त व वमन (तालिका)।

## रोग के कारक

**प्रतिकूल मौसम** : अधिक तापमान व आर्द्रता, या अधिक तापमान व कम आर्द्रता, कम तापमान व कम आर्द्रता या तापमान व आर्द्रता में अधिक उतार-चढ़ाव (सेन व जौली, 1967; पाटिल, 1990; सिंह व अन्य 1991; हरीश चन्द्रा, 1994)।

**अनपयुक्त पोषण** : निम्न गुणवत्ता वाली पत्तियों का पोषण; कीट की अवस्था की दृष्टि से अनुपयुक्त पत्तों का पोषण अर्थात् वयस्क लावों को कोमल पत्तियां एवं तरुण या अल्प वयस्क लावों को परिपक्व या सख्त पत्तियाँ खिलाना (गोयल, 1991; सैमसन 1995)।

सीमित क्षेत्र में अधिक कीटों का पालन (बरली 1972); अवैज्ञानिक या अनुचित तरीके के कीटनाशक या निसंक्रामक इत्यादि का उपयोग (सैमसन, 1995); दूषित तथा संक्रमित पत्तियाँ खिलाना (सैमसन, 1922), एवं संक्रमित वातावरण में बीज उत्पादन संबंधी कार्य, कीटाणु उत्पादन एवं कीटपालन (मौर्या व अन्य, 1992)।

## संक्रमण स्थल एवं माध्यम

खाद्य पौधों की पत्तियों के द्वारा भोजन नलिका में प्रवेश कर जाने वाले बैक्टीरिया आंत की दीवार को नुकसान पहुंचाते हैं तथा पाचन-क्रिया को प्रभावित करते हैं। साथ ही, कुछ बैक्टीरिया संवेदनशील कोशिकाओं में प्रवेशकर उनको तहस-नहस कर देते हैं। सौटो जैसी बीमारी उत्पन्न करनेवाले

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**किसी फसल की सफलता में हानिकारक रोगों की पहचान एवं उनके प्रकोप पर नियंत्रण एक महत्वपूर्ण घटक है। ओक तसर रेशमकीट में बैक्टीरिया रोग से होनेवाली मृत्यु-दर की प्रतिशतता चिन्ताजनक है। प्रस्तुत लेख में रोग के लक्षण व उपायों पर प्रकाश डाला गया है।**

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कवक से ग्रस्त हो जाता है जिनमें बैक्टीरिया रोग अत्यन्त चिन्ता का विषय है। बैक्टीरिया रोग से ओक तसर रेशमकीटों में लगभग 37-39% तक मृत्यु-दर आंकी गयी है (सिंह व अन्य, 1991)। प्रथम (वसंत) फसल की अपेक्षा द्वितीय (ग्रीष्म) फसल तथा तृतीय (शरत्) फसल में इस रोग से अधिक हानि होती है।

## रोग के प्रकार एवं लक्षण

बैक्टीरिया रोग मुख्यतः तीन प्रकार का होता है (राव व निगम, 1986) जिन्हें सामान्यतः अलग-अलग तीन लक्षणों से पहचाना जाता है। ये लक्षण हैं, रेशमकीट द्वारा जंजीर की तरह विष्टा उत्सर्जित करना; गुदा कपाट का चिपक कर बन्द



तालिका : बैक्टीरियल रोग के प्रकार, रोगाणु व संक्रमण के माध्यम			
रोग	रोगाणु	स्रोत	संक्रमण का माध्यम
जंजीर सदृश विष्ठा	स्ट्रेप्टोकोकस एवं स्टेफाइलोकोकस प्रजाति	आंत	-
गुदा कपाट (एनल लिप्स) बन्द होना	वैसीलस स्फैरीकस एवं एसकैरीचिया कोलाई	हवा/पत्तियां	मुख से
मलाशय उद्वर्तन (प्रोट्रयूजन)	स्ट्रेफाइलो कोकस एवं स्ट्रेप्टोकोकस प्रजाति	आंत	-
	प्रोटियस प्रजाति एवं पैण्टोइया एलोमैरन्स	हवा/पत्तियां/आंत	मुख से
	एसकैरीचिया कोलाई	खाद्य पौधे/पत्तियां	-
ब्लैक थोरैक्स एवं रैड सैप्टीसैमिया	क्लैम्सीला न्यूमोनियाई पैण्टोइया एलोमैरन्स स्ट्रेप्टोकोकस फीकेलिस	बाह्य सतह/आंत पत्तियां/हवा	कटी फटी जगह
	वैसीलस माइक्रोडस, वैसीलस, प्रोटियस, माइक्रोकोकस प्रजाति, स्टैफाइलोकोकस साइट्रियस, स्ट्रेप्टोकोकस फीकेलिस।	हवा/पत्तियां	मुख से
	सिरैसिया प्रजाति	कीट की बाह्य सतह	कटी-फटी सतह/अंग से
सौटोटाइप रोग शरीर में सिकुड़न एवं कमजोरी	वैसीलस थुरिनजियेन सिस कौरीनेफोर्म प्रजाति	हवा/पत्तियां	मुख से
	पैण्टोइया एलोमैरन्स, क्लैम्सीला न्यूमोनियाई	हवा/पत्तियां/कीट की बाह्य सतह।	मुख से
दस्त व वमन	वैसीलस स्फैरीकस, वैसीलस, क्लैम्सीला प्रजाति	हवा/पत्तियां/बाह्य सतह	मुख से
	एलकलीजीन्स फीकेलिस माइक्रोकोकस प्रजाति		कटी-फटी सतह

बैक्टीरिया नाड़ीमण्डल को शक्तिहीन कर देते हैं। सैप्टीसैमिया में बैक्टीरिया, आंत की दीवार के क्षतिग्रस्त होने की जगह से रूधिरलसिका में प्रवेश करते हैं अन्यथा शरीर के बाह्य भाग की कटी-फटी जगह से प्रवेश कर रूधिरलसिका के साथ शरीर में फैल जाते हैं तथा बाधा उत्पन्न करते हैं।

कृत्रिम संक्रमण के दौरान मलाशय बाहर आ जाने जैसे रोग के समान कीट के शरीर की कटी-फटी जगह से संक्रमण देखे गये हैं।

## निदान एवं नियंत्रण के उपाय

बैक्टीरिया रोग से रेशमकीट उपचार की किसी प्रभावी तकनीक का विकास अभी तक नहीं हुआ है। तथापि, निम्न-लिखित सावधानियाँ प्राथमिक रूप से रोग के रोकथाम में सहायक पायी गयी हैं :

※ बीज कोसों का परिरक्षण/संरक्षण मुख्य रूप से सैद्धान्तिक तकनीक के अनुसार एवं विसंक्रमित बीजागार में ही करना चाहिए।

※ विशेष रूप से कीटपालन में स्वस्थ बीज समूहों का ही उपयोग श्रेयस्कर है।

※ अण्डों का उष्मायन उचित वैज्ञानिक तरीके से करना (मौर्या व अन्य, 1992)।

※ प्रथम अवस्था में कीट का पालन विसंक्रमित कीटपालन गृह में सावधानीपूर्वक करना, खुले वातावरण में भोज्य पौधों/झाड़ियों पर रेशमकीटों का स्थानान्तरण दूसरी अवस्था के बाद ही उचित होता है (सिन्हा व अन्य, 1994)।

※ रेशमकीटों के आहार पर समुचित ध्यान देते हुए उन्हें उत्तम गुणयुक्त, क्लोरोफिलयुक्त व कीटावस्था के अनुरूप परिपक्व पत्तियाँ ही खिलाये (मत्सूमूरा, 1930; गोयल, 1991)।

※ कीटपालन के दौरान रेशमकीटों को हाथ से कम से कम छूना अन्यथा भी, उन्हें किसी तरह की चोट लगने से बचाये (स्टीनहाऊस, 1967)।

※ कीटपालन प्रक्षेत्र में 4-5% फार्मलीन का छिड़काव अवश्य करें। वर्षाकाल में कीटपालन के दौरान जमीन पर पानी

जमा हो जानेवाले क्षेत्रों में फार्मलीन घोल का छिड़काव करें (चन्द्रा, 1997)।

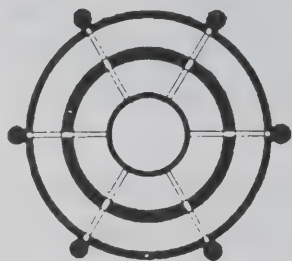
※ रोगाणुग्रस्त कृमियों को तुरन्त कीटपालन प्रक्षेत्र से दूर ले जाकर जला दे या उनपर फार्मलीन डालकर जमीन में गाड़ दें।

※ समय-समय पर रेशमकीट के नाशक व नाशीकीटों को नष्ट करते रहना चाहिए जिससे रोग पर नियंत्रण रहे।

※ चतुर्थ व अंतिम अवस्था में कीटों के उपचार के लिए जैष्टा माइशिन (00.1-0.15%) पानी के घोल का छिड़काव पत्तियों पर करें (चन्द्रा, 1997)।

※ तापमान व आर्द्रता का विशेष ध्यान रखना भी अत्यन्त महत्वपूर्ण है (सैमसन, 1995)।

लेखक क्षेत्रीय तसर अनुसंधान केन्द्र, भीमताल (नैनीताल) में कार्यरत हैं।



# Exports Review

Foreign exchange earnings of the Indian silk industry during the month of September '97 amounted to Rs. 8631.26 lakh compared to Rs. 8680.04 lakh during September '96.

During April to September '97

## Review of Silkgoods Certified for Exports

During September 1997 and April to September '97 period of the year 1997-98

TABLE - I

### Export Performance of Indian Silk Industry

(Unit : Lakh ; Qty : Silkgoods ; Sq. Mtrs. ; Silkyarn/Silkwaste : Kg ; Value : Rs.)

Item of Export	September				% Increase		April to September				% Increase	
	1997		1996				1997		1996			
	Qty.	Value	Qty.	Value	Qty.	Value	Qty	Value	Qty.	Value	Qty.	Value
A. Silkgoods :												
(1) Mulberry												
(i) Dress Material	17.73	2947.75	20.30	3332.28	-12.7	-11.5	93.79	16273.10	99.69	16157.73	-5.9	0.7
(ii) Readymade Garments	7.83	20116.05	11.69	2404.59	-33.0	-16.2	26.79	8282.44	51.62	10792.47	-48.1	-23.3
(iii) Carpets	0.15	1241.60	0.09	711.15	66.7	74.6	0.49	4333.62	0.45	3379.80	8.9	28.2
(iv) Sarees	3.20	708.06	3.27	651.53	-2.1	8.7	17.57	3680.17	19.16	3520.45	-8.3	4.5
(v) Scarves/stoles	4.48	471.09	8.14	797.52	-45.0	-40.9	28.68	3003.07	37.48	3600.50	-23.5	-16.6
(vi) Others	3.70	589.26	2.92	480.08	26.7	22.7	14.64	2900.65	16.76	2743.09	-12.6	5.7
Mulberry Total [i to vi]	37.09	7973.81	46.41	8377.15	-20.1	-4.8	181.96	38473.05	225.116	40194.04	-19.2	-4.3
(2) Tasar	0.53	106.22	0.59	152.80	-10.2	-30.5	3.71	605.55	4.92	903.12	-24.6	-32.9
Total [1+2]@	37.62	8080.03	47.00	8529.95	-20.0	-5.3	185.67	39078.60	230.08	41097.16	-19.3	-4.9
(3) Mixed/Blended	2.73	406.47	1.64	143.74	66.5	182.8	12.65	1785.30	10.96	1064.59	15.4	67.7
Total [1+2+3]	40.35	8486.50	48.64	8673.69	-17.0	-2.2	198.32	40863.90	241.04	42161.75	-17.7	-3.1
B. SILKYARN	0.04	8.62	Neg.	0.94			0.07	41.92	0.04	43.42	75.0	-3.5
C. SILKWASTE	0.75	136.14	0.04	5.41			2.96	515.48	0.08	11.40		
TOTAL [A+B+C]		8631.26		8680.04		-0.6		41421.30		42216.57		-1.9

@ Refers to total natural silk goods exports.

period of the year 1997-98, foreign exchange earnings from silkgoods certified for exports amounted to Rs. 41421.30 lakh as against Rs. 42216.57 lakh during the corresponding period of previous year.

Data on itemwise silkgoods certified for exports by Central Silk Board are given in Table - I.

Comparative data on region-wise silkgoods certified for exports are given in Table-II.

### Natural silkgoods

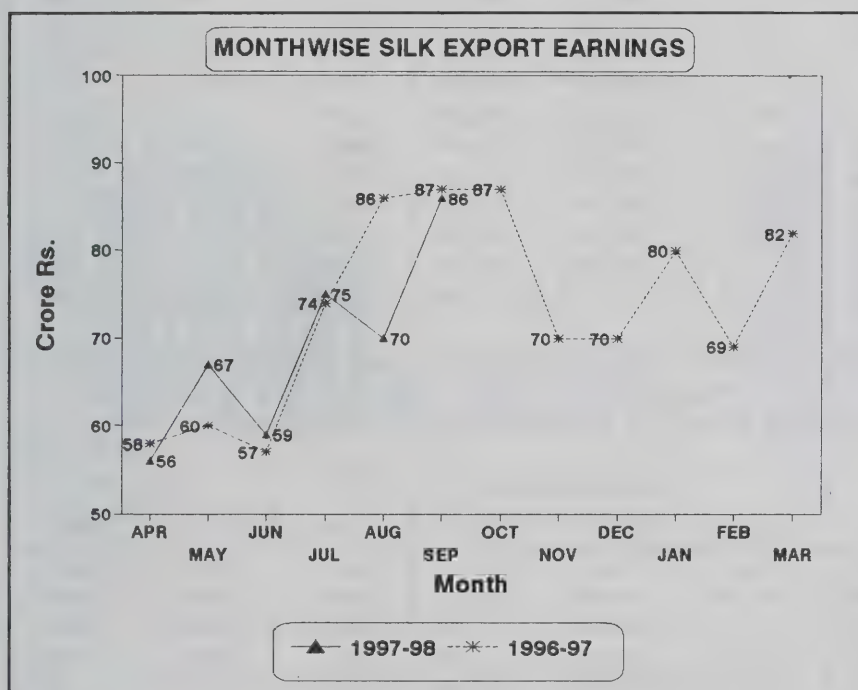
During September '97, natural silkgoods certified for exports amounted to 37.62 lakh sq. mtrs. valued at Rs. 8080.03 lakh as against 47 lakh sq. mtrs.



**Table - II**  
**Regionwise Silkgoods certified for exports**

[Unit:Lakh;Qty:Sq.mtrs;Value:Rs.]

Region	September						April to September					
	1997		1996		% Increase		1997-98		1996-97		% Increase	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
West Europe	12.60	2936.46	15.92	3017.33	-20.9	-2.7	79.60	16201.78	93.33	16586.31	-14.7	-2.3
U.S.A. & Others	16.59	3408.67	19.91	3758.32	-16.7	-9.3	68.34	15896.17	93.34	17555.87	-26.8	-9.5
Asia	8.72	1521.40	8.81	1257.75	-1.0	21.0	40.43	6408.58	40.34	5543.77	0.2	15.6
Japan & Others	0.59	206.50	1.23	259.09	-52.0	-20.3	4.00	1042.46	5.57	1252.56	-28.2	-16.8
Africa	1.11	343.26	0.45	120.54	146.7	184.8	3.90	1081.79	3.30	634.01	18.2	70.6
East Europe	0.74	70.21	2.32	260.66	-68.1	-73.1	2.05	233.12	5.16	589.23	-60.3	-60.4
Total	40.35	8486.50	48.64	8673.69	-17.0	-2.2	198.32	40863.90	241.04	42161.75	-17.7	-3.1



lakh during the corresponding period of 1996-97 and showed a decrease of 19.2% in quantity and 4.3% in value. Out of the total natural silkgoods certified for exports, the share of mulberry silkgoods roughly amounted to 98% both in quantity and value.

Countrywise data of mulberry silkgoods certified for exports is given in Table - III.

### Varietywise mulberry silkgoods

During April to September '97 period of the year 1997-98, among the various varieties of mulberry silkgoods certified for exports, dress materials ranked first followed by readymade garments, carpets, sarees and scarves/stoles. Data of varietywise mulberry silkgoods certified for exports are given in Table - I.

### Tasar silkgoods

During September '97, tasar silkgoods certified for exports amounted to 0.53 lakh sq.mtrs. valued at Rs. 106.22 lakh compared with 0.59 lakh sq.mtrs. valued at Rs. 152.80 lakh during September '96.

During April to September '97 period of the year 1997-98, a total

valued at Rs. 8529.95 lakh during the corresponding month of previous year.

During April to September '97 period of the year 1997-98, the aggregate natural silkgoods certified for exports amounted to 185.67 lakh sq. mtrs. valued at Rs. 39078.60 lakh as against 230.08 lakh sq. mtrs. valued at Rs. 41097.16 lakh during the corresponding period of preceding year and showed a decrease of 19.3% in quantity and 4.9% in value.

### Mulberry silkgoods

During September '97, mulberry silkgoods certified for exports amounted to 37.09 lakh sq.mtrs. valued at Rs. 7973.81 lakh as against 46.41 lakh sq. mtrs. valued at Rs. 8377.15 lakh during September '96.

During April to September '97 period of the year 1997-98, mulberry silkgoods certified for exports amounted to 181.96 lakh sq. mtrs. valued at Rs. 38473.05 lakh compared with 225.16 lakh sq. mtrs. valued at Rs. 40194.04

**Table - III**  
**Foreign Exchange Earnings from Mulberry Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	September		%	April to September		%	Country Share Percentage in	
	1997	1996		1997	1996		1997	1996
U.S.A.	2995.31	3430.05	-12.7	13647.43	15169.85	-10.0	35.5	37.7
Germany	1050.09	1073.40	-2.2	5537.28	5530.68	0.1	14.4	13.8
U.K.	514.43	742.21	-30.7	3755.66	4280.13	-12.3	9.8	10.6
France	325.01	214.27	51.7	1558.96	1344.08	16.0	4.1	3.3
Canada	223.87	237.59	-5.8	1313.10	1384.02	-5.1	3.4	3.4
U.A.E.	283.19	239.42	18.3	1310.18	1147.71	14.2	3.4	2.9
Singapore	371.34	337.49	10.0	1253.39	1185.00	5.8	3.3	2.9
Italy	234.28	134.88	73.7	1112.63	887.80	25.3	2.9	2.2
Hong Kong	198.70	264.00	-24.7	979.55	858.86	14.1	2.5	2.1
Netherlands	92.05	168.69	-45.4	750.11	901.28	-16.8	1.9	2.2
Denmark	69.11	66.42	4.0	551.74	385.25	43.2	1.4	1.0
Australia	92.94	124.60	-25.4	535.25	734.52	-27.1	1.4	1.8
Switzerland	100.80	77.63	29.8	431.46	493.52	-12.6	1.1	1.2
Mauritius	173.76	40.95	324.3	425.74	206.83	105.8	1.1	0.5
Malaysia	93.31	96.71	-3.5	397.91	314.28	26.6	1.0	0.8
Spain	80.69	103.97	-22.4	358.21	435.64	-17.8	0.9	1.1
Thailand	118.86	52.10	128.1	322.45	113.48	184.1	0.8	0.3
Japan	56.93	67.25	-15.3	303.59	321.50	-5.6	0.8	0.8
Austria	58.78	103.91	-43.4	281.74	362.23	-22.2	0.7	0.9
Portugal	38.26	26.45	44.7	280.41	267.56	4.8	0.7	0.7
Others	802.10	775.16	3.5	3366.26	3869.82	-13.0	8.7	9.6
Total	7973.81	8377.15	-4.8	38473.05	40194.04	-4.3	100.0	100.0

@ Refers to top 20 importing countries

**Table - IV**  
**Foreign Exchange Earnings from Tasar Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	September		%	April to September		%	Country Share Percentage in	
	1997	1996		1997	1996		1997	1996
U.S.A.	14.94	13.69	9.1	90.85	187.37	-51.5	15.0	20.7
Germany	11.33	19.42	-41.7	90.20	163.82	-44.9	14.9	18.1
U.A.E.	14.97	8.42	77.8	69.76	96.28	-27.5	11.5	10.7
Hong Kong	10.29	7.62	35.0	50.27	11.27	346.1	8.3	1.2
Japan	24.00	31.10	-22.8	48.72	62.94	-22.6	8.0	7.0
France	10.28	4.62	122.5	44.13	31.91	38.3	7.3	3.5
Italy	7.77	4.42	75.8	27.74	26.49	4.7	4.6	2.9
Brazil	-	2.03	-100.0	25.18	15.33	64.3	4.2	1.7
Turkey	0.67	6.03	-88.9	15.76	8.49	85.6	2.6	0.9
Spain	4.78	0.82	482.9	15.05	12.09	24.5	2.5	1.3
U.K.	2.07	12.78	-	13.95	64.08	-78.2	2.3	7.1
Belgium	-	-	-	11.74	2.81	317.8	1.9	0.3
Saudi Arabia	0.12	-	-	11.46	4.19	173.5	1.9	0.5
South Africa	-	3.45	-100.0	11.23	9.03	24.4	1.9	1.0
Colombia	-	-	-	9.60	-	-	1.6	0.0
Canada	0.58	-	-	7.43	25.67	-71.1	1.2	2.8
Chile	-	-	-	6.85	4.29	59.7	1.1	0.5
Yugoslavia	-	-	-	6.22	9.13	-31.9	1.0	1.0
Afghanistan	-	-	-	5.92	2.10	181.9	1.0	0.2
Australia	0.21	14.01	-98.5	5.69	26.33	-78.4	0.9	2.9
Others	4.21	24.39	-82.7	37.80	139.50	-72.9	6.2	15.4
Total	106.22	152.80	-30.5	605.55	903.12	-32.9	100.0	100.0

@ Refers to top 20 importing countries

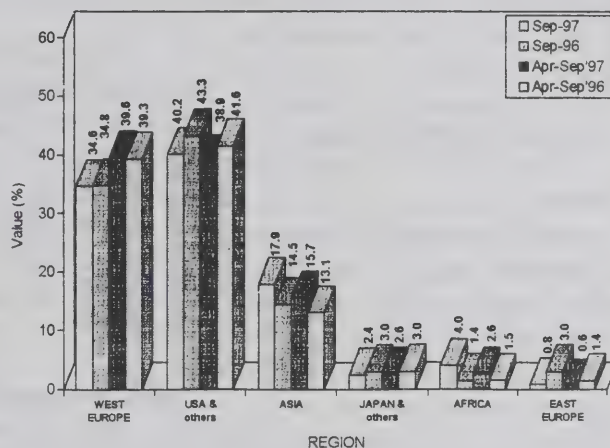
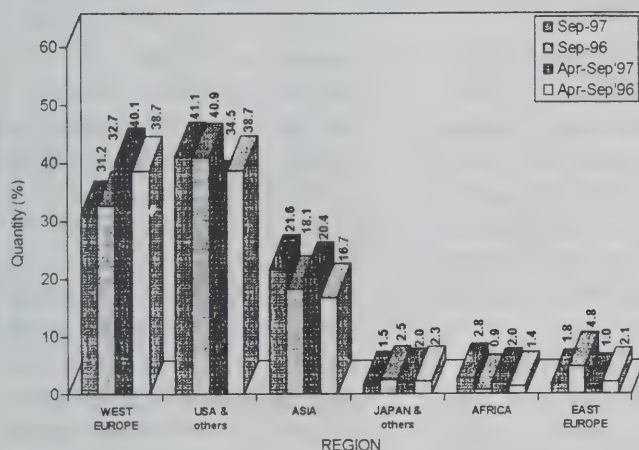


**Table - V**  
**Unit Export Price**

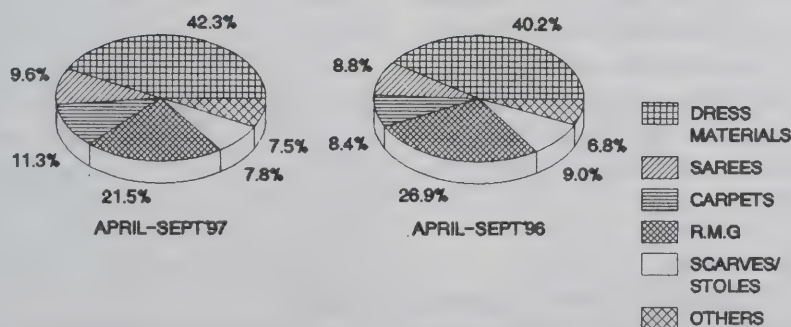
(Rs. per Sq.mtr.)

Item	September			April-September		
	1997	1996	% Increase	1997	1996	% Increase
A. Mulberry Silkgoods						
1. Excl. Carpets	182.24	165.49	10.1	188.13	163.82	14.8
2. Incl. Carpets	215.00	180.48	19.1	211.44	178.51	18.4
3. Carpets	8507.06	7628.73	11.5	8872.91	7547.56	17.6
B. Tasar Silkgoods	200.37	258.21	-22.4	163.29	183.65	-11.1

### REGION-WISE SILKGOODS CERTIFIED FOR EXPORTS



### Share percentage of Varietywise Mulberry Silkgoods Export Earnings



quantity of 3.71 lakh sq. mtrs. of tasar silkgoods valued at Rs. 605.55 lakh was certified for exports as against 4.92 lakh sq. mtrs. valued at Rs. 903.12 lakh during the corresponding period of previous year.

Countrywise data of tasar silkgoods certified for exports are given in Table-IV.

#### Unit export price

The unit export price realised for mulberry and tasar silkgoods during September'97 and April to September '97 period of the year 1997-98 along with comparative data of previous year are given in Table-V.

## Mixed or blended silkgoods

During September '97, mixed/blended silkgoods certified for exports amounted to 2.73 lakh sq.mtrs. valued at Rs. 406.47 lakh compared with 1.64 lakh sq. mtrs. valued at Rs. 143.74 lakh during September '96 and showed a perceptible increase both in quantity and value.

Mixed/blended silkgoods certified for exports during April to September '97 period of the year 1997-98 amounted to 12.65 lakh sq. mtrs. valued at Rs. 1785.30 lakh compared with 10.96 lakh sq. mtrs. valued at Rs. 1064.59 lakh in the corresponding period of previous year and reflected an increase of 15.4% in quantity and 67.7% in value.

## Silkyarn

About seven tons of spun and noil silk yarn valued at Rs. 41.92 lakh has been certified for exports during April to September '97 period of the year 1997-98 as against 4 tons valued at Rs. 43.42 lakh in the corresponding period of 1996-97.

## Silkwaste

Silkwaste and its by-products certified for exports during April to September '97 period of the year 1997-98 amounted to 296 tons valued at Rs. 515.48 lakh as against 8 tons valued at Rs. 11.40 lakh in the corresponding period of previous year.

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(Continued from page 40)

## France : Annual Report 1996

declined considerably. This confirms that demand for imported silk fabrics remained poor in France throughout 1996.

The use of these items for accessories and garments has shown a distinct cut, especially for basic articles such as silk scarves made of twill, blouses etc.

Difficulties in obtaining raw-material supplies and the sharp reduction in Chinese production in 1996 had no effect on the demand in 1996, which remained poor.

The major drawbacks to the revival of demand seem to be : the chronic unevenness of quality standards, the considerable drop in prices over the past few years, the deterioration of the image of silk and the difficulty in satisfying demand for machine-washable silks.

## Silk accessories

Great efforts have been made to maintain silk as a priority in the collections. The competition from Asian silk scarves at dumping-level prices have completely shattered the image of silk as a luxury product.

The consumer is thus, in a state of utter confusion and the result is a serious drop in sales of silk scarves made from classic, high-quality twills and crepes in 90 x 90 cm size. The manufacturers have been forced to switch to new, original qualities of fabrics woven in France which stand apart from the classic items and include silk blended with other fibres.

## Conclusion

The year 1996 is a perfect reflection of the sharply-con-

trasting situation of our industries, from an overall cut in their activities.

This weakness of the market is mainly due to the worrying situation of our fibre :

- Chinese production sharply declined (roughly 50% this year) after considerable increases in 1992 and 1994.
- the persistent cleavage between cheap garment exports from China, on a totally free market, and raw-silk yarn and fabric exports under the control of China's silk and subject to export quotas.
- the role of the large retailing groups who have used silk as a loss-leader then dropped it when the quotas started to bite.
- what is even more serious, the loss of image, both among the general public and the designers who have been disillusioned by the poor quality of the foreign (mainly Chinese) products sold in the mass-distribution circuit (e.g. care problems, incoherence of quality).
- silk is only 0.2% of world textile-fibre consumption, a long way behind synthetic and artificial fibres (polyester, viscose etc.).

This situation has been aggravated by the absence of any silk promotion for the past ten years. What is needed is the mobilisation of all participants-producer countries and consumer countries. If wool has managed to maintain its quality label, should not silk go in the same direction with its own specific criteria?

(Courtesy: ISA Newsletter)



# Silk Prices

September 1997

## Raw Silk : Volume of Transaction

At all the silk exchanges in Karnataka, a total quantity of 106.902 tons of all qualities of raw silk valued at Rs.1126.870 lakh was transacted during the month of September '97 as against a quantity of 108.172 tons valued

volume of transaction at Bangalore Silk Exchange alone accounted for 82.3% and 79.5% in both quantity and value, respectively.

During the first six months period of the year 1997-98 (i.e., April to September '97) at Bangalore Silk Exchange, a total quantity of 700.606 tons of all qualities of raw silk valued at Rs. 6788.345 lakh

was transacted. The volume of trade at Bangalore Silk Exchange during the period April to September '97 accounted for 81.4% in quantity and 78% in value of the total transaction in all silk exchanges of the State.

Data on qualitywise transaction of raw silk at Bangalore Silk Exchange *vis-a-vis* all silk exchanges in Karnataka during

**Table I. Transaction of Raw Silk at Bangalore Silk Exchange**

Raw Silk Quality	(Qty. : Tonnes, Value : Lakh Rs.)							
	September '97		September '96		April '97-September '97		April '96-September '96	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Filature/ Cottage Basin	20.684 (32.071)	273.024 (426.475)	21.832 (34.739)	278.022 (449.378)	126.749 (224.945)	1619.175 (2878.605)	131.489 (244.052)	1722.433 (3172.397)
Charka	46.278 (51.339)	515.092 (575.320)	45.422 (51.523)	520.380 (592.386)	420.799 (476.777)	4299.208 (4908.533)	377.905 (454.048)	4120.009 (4968.847)
Dupion	21.045 (23.492)	107.501 (125.075)	21.681 (21.910)	111.158 (112.673)	153.058 (158.618)	869.962 (911.396)	130.555 (131.144)	786.59 (790.269)
Total	88.007 (106.902)	895.617 (1126.870)	88.935 (108.172)	909.560 (1154.437)	700.606 (860.340)	6788.345 (8698.534)	639.949 (829.244)	6629.032 (8931.513)

+ Figures in bracket refer to total transaction at all the Silk Exchanges in Karnataka.

at Rs. 1154.437 lakh during September '96. During the first six months period of the year of 1997-98 (i.e., April to September '97), at all the silk exchanges in Karnataka, a total quantity of 860.340 tons valued at Rs. 8698.534 lakh was transacted as against 829.244 tons valued at Rs. 8931.513 lakh of the preceding year.

## Bangalore Silk Exchange

At Bangalore Silk Exchange alone which is the largest exchange in Karnataka, a total quantity of 88.007 tons of all qualities of raw silk *viz.*, filature/cottage basin, charka and dupion, valued at Rs. 895.617 lakh was transacted during the month of September '97 as compared to 88.935 tons valued at Rs. 909.560 lakh during September '96. Of the total transaction in the State, the

**Table II. Transaction of raw silk of different qualities at Bangalore Silk Exchange during September '97**

Denier	Quality	Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
				Min.	Max.	W. Avg.
Filature Rawsilk						
13/15	Fine	63	87492	1380	1380	1380
14/16	Fine	1494	2052662	1290	1450	1374
16/18	Fine	3674	4926540	1102	1470	1341
18/20	Medium	4767	6211198	800	1470	1303
20/22	Medium	7333	9611120	400	1500	1311
22/24	Medium	250	299212	1130	1300	1197
24/26	Medium	330	416243	1190	1350	1261
26/28	Coarse	1976	2672167	1175	1500	1352
28/30	Coarse	352	444292	1020	1530	1262
30/32	Coarse	445	581474	1150	1500	1307
	Total	20684	27302400	400	1530	1320
Charka Raw silk						
	Coarse	604	449140	630	1035	744
	Medium	6132	5893143	700	1320	961
	Fine	39542	45166917	820	1395	1142
	Total	46278	51509200	630	1395	1113



**Table III. Prices of Indigenous Silk**

(Rs./Kg)							
Silk Exchange	Variety	September '97			September '96		
		Min	Max	Avg	Min	Max	Avg
Bangalore Silk Exchange (Karnataka)	Filature/Cottage Basin	400	1530	1320	450	1575	1273
	Charka	630	1395	1113	400	1450	1146
	Dupion	150	810	511	115	830	513
Anna Silk Exchange, Kanchipuram Market (Tamil Nadu)	Filature/Cottage Basin	1100	1300	1214	1220	1420	1301
	Charka	800	970	904	900	1085	985

**Imported Silk (Varanasi Market)**

(Rs./Kg)				
Filature Silk 20/22 Dr	September '97		September '96	
	Min	Max	Min	Max
Chinese	1550	1700	1250	1350
Korean	1580	1650	1235	1330

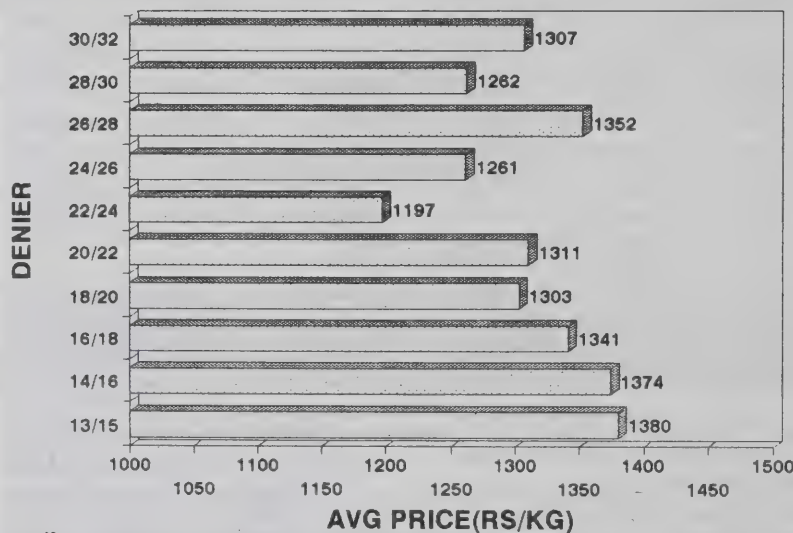
September '97, September '96, April '97 to September '97 and April '96 to September '96 are given in Table-I. The transaction of different deniers of filature/cottage basin raw silk and qualitywise charka raw silk at Bangalore Silk Exchange during September '97 is given in Table-II.

#### Prices of sericultural commodities

The prices of different qualities of indigenous raw silk ruled at Bangalore Silk Exchange (Karnataka) and Anna Silk Exchange (Tamil Nadu) in addition to prices of imported raw silk at Varanasi market during the month of September '97 in comparison with September '96 are given in Table - III.

The prices of different varieties of mulberry reeling cocoons quoted at important cocoon markets of southern states viz., Karnataka, Tamil Nadu and Andhra Pradesh are given in Table IV.

**Average Prices of Denierwise Filature Raw Silk Transacted at Bangalore Silk Exchange**



**Table IV. Mulberry Reeling Cocoon Prices**

(Rs./kg.)						
State	Market	Variety	September '97		September '96	
			Min	Max	Min	Max
Karnataka	Ramanagaram	Imp. cross breed	50	165	78	161
	T. Narasipur	Ord. cross breed	40	86	28	87
Tamil Nadu	Vaniyambadi	Imp. cross breed	56	120	54	127
	Coimbatore	Imp. cross breed	70	139	42	106
Andhra Pradesh	Hyderabad	Multivoltine	38	124	30	109
	Dharmavaram	Multivoltine	37	131	41	128

*Compiled by Statistical Section, CSB*





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# Let Us Think Aloud

**I**t is a matter of concern that the non-mulberry raw silk production of the country is stagnant (decreasing in case of Muga) over the last few years in spite of the continued efforts of the developmental agencies to averse the trend. The constraints, as we discussed in earlier occasions in this very column, are quite familiar but a bit hard to overcome.

The very wild nature of the non-mulberry sector influences the developmental activities rather adversely and contributes to the low productivity and production. The persisting problems like inadequate supply of quality seeds due to poor infrastructure for large multiplication, scattered plantation of natural food plants, obsolete reeling devices and practices, absence of proper marketing system etc. are increasingly making the sector unattractive.

On the other hand, the export front has registered an increasing demand trend in the recent years for the mixed/blended non-mulberry silk goods which signals out the urgent need to intensify our efforts at product diversifica-

tion and to introduce a wide range of products and designs to suit the market demand.

There is a need to redefine the priority areas, intensify the R & D efforts, strengthen the extension, to create better marketing infrastructure and to give a touch of imagination to the end product to make it saleable. And, all these certainly call for an integrated approach from all the quarters. Thus, the situation calls for a loud thinking.

The 3rd International Conference on Wild Silkmoths being organised in India, jointly by the Central Silk Board and the International Society for Wild Silk Moths during November, 1998 provides an excellent opportunity for the scientists, the policy makers, the developmental agencies and all other concerned, to air their ideas and to come out with a long term action plan that ensures the well-being of the non-mulberry sector and economic upliftment of the tribal community, as well.

 Editor



## Question & Answer

**R.Ravi Kumar,  
Mysore**

**Q.** I have an M.Sc. in sericultural technology from CSR&TI, Mysore and now I am planning to take up mulberry and silkworm rearing on my own, but no finance to venture out. In what way I can approach the banks and other institutions to get financial support for the purpose ?

**A.** State Departments of Sericulture generally do have certain schemes for encouraging entrepreneurs like you. They will follow-up credit disbursement from local commercial and co-operative banks. The banks finance for both on-farm and non-farm sectors of sericulture as per the NABARD guidelines. You may approach the local sericulture extension officer of your area regarding the details of the credit and subsidy schemes.

Besides, the Central Silk Board conducts entrepreneurship development programmes in different parts of the country from time to time, in both pre-cocoon and post-cocoon sectors. The Board is organising such a programme in Mysore during February-March, 1998 which aims at not only imparting training on on-farm technologies in sericulture but also assisting in forward and backward linkages of credit arrangement for the project.

For more details, you may contact the Co-ordinator of the programme at the Central Sericultural Research & Training Institute, Manandavadi Road, Srirampuram, Mysore- 570 008.

## Indian Silk

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— Editor

## Announcement

### 3rd International Conference on Wild Silkmoths

The Third International Conference on Wild Silkmoths will be held in India from November 11-14, 1998 at Bhubaneswar, Orissa. The objective of this Conference, organised jointly by the International Society for Wild Silkmoths and the Central Silk Board, Govt. of India is to promote the basic studies in insect biology, applied aspects of technical research relating to development and utilisation of various wild silkmoths and also to provide a platform for exchange of information among scientists and technologists.

Under the theme "Wild Silkmoth Research, Conservation and Utilisation", the Conference intends to deliberate and invite oral and poster presentations on the following themes :

#### Plenary Lectures

- \* Rearing methods, seed and cocoon production
- \* Physiology, Biochemistry and Genetics
- \* Cocoon filament character and post-cocoon technology
- \* Conservation and utilisation of wild silkmoths
- \* Non-textile utilisation of wild silks

#### Workshops

- \* Recent studies in Japanese wild silkmoths
- \* Recent studies in Chinese tasar silkmoths
- \* Recent studies in Indian tasar, eri and muga wild silkmoths
- \* Utilisation of non-mulberry silks

Besides, there will be an exhibition displaying both technological innovations and popular products in the market. The registration fee is Rs.2000/- for Indian participant and US\$ 200 for foreign participant (excl. boarding and lodging).

For more details, the prospective authors, exhibitors and participants may contact :

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# New Bivoltines for Tropical Conditions

S. Krishna Rao, Rajendra Mundkur, G.S. Rajanna, R. Raghuraman,  
M.L. Shivamallu and L. Mahadevappa

**I**ndia has a strong sericultural base, having enormous potential for boosting cocoon/silk production. Silkworm races have a major role in this direction especially under tropical situations. Keeping in view various factors, it is imperative to develop silkworm races that suit local conditions. In

**Popularisation and acceptance of bivoltine as a concept amongst the Indian sericulturists squarely depend on its crop stability and capability to climatic and seasonal fluctuations of different eco-zones of the country. The authors dovetail the experiment conducted by KSSRDI, Bangalore in various parts of Karnataka in its quest for evolving new bivoltine races suitable for all seasons and climates which, at the same time, capable of providing higher returns for the beneficiaries.**

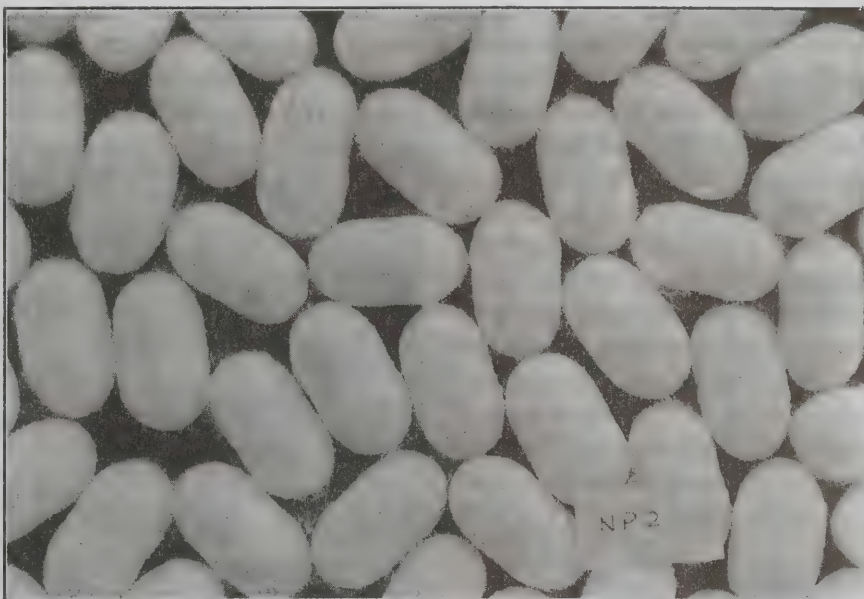


Fig. 1. Cocoons of NP<sub>2</sub>

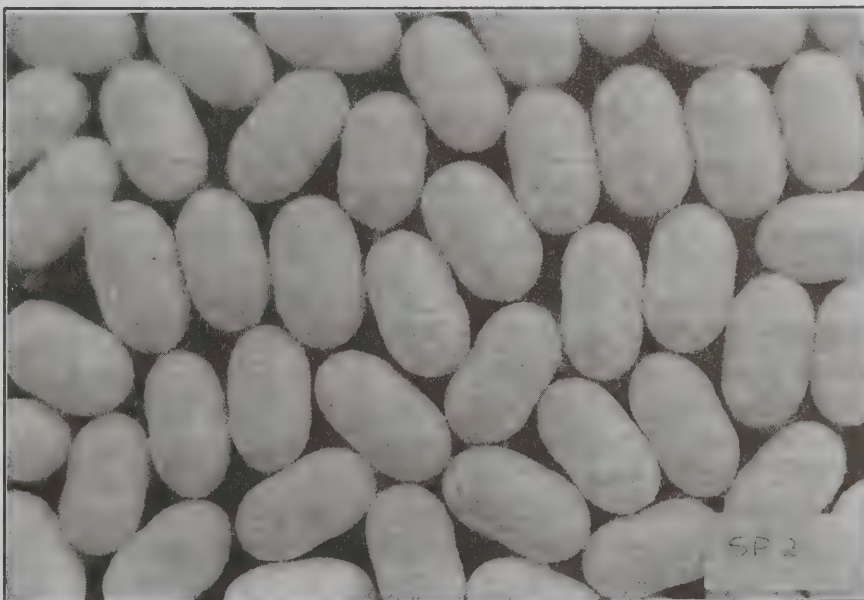


Fig. 2. Cocoons of SP<sub>2</sub>

India's context under the prevailing stability due to higher survival is  
ing situation, the bivoltine crop more relevant than higher

**Table 1: Racial characters of new bivoltine races**

Character / race	NP <sub>2</sub>	SP <sub>2</sub>	KSO-1
Larval marking	Plain	Plain	Plain
Larval colour (5th instar)	Bluish	Bluish	Faint Bluish
Cocoon colour	White	White	White
Cocoon shape	Short Dumbbell with light constriction and rounded ends	Short Dumbbell with light constriction and rounded ends	Oval
Cocoon shell grains	Medium	Medium	Medium
Cocoon shell	Compact	Compact	Compact

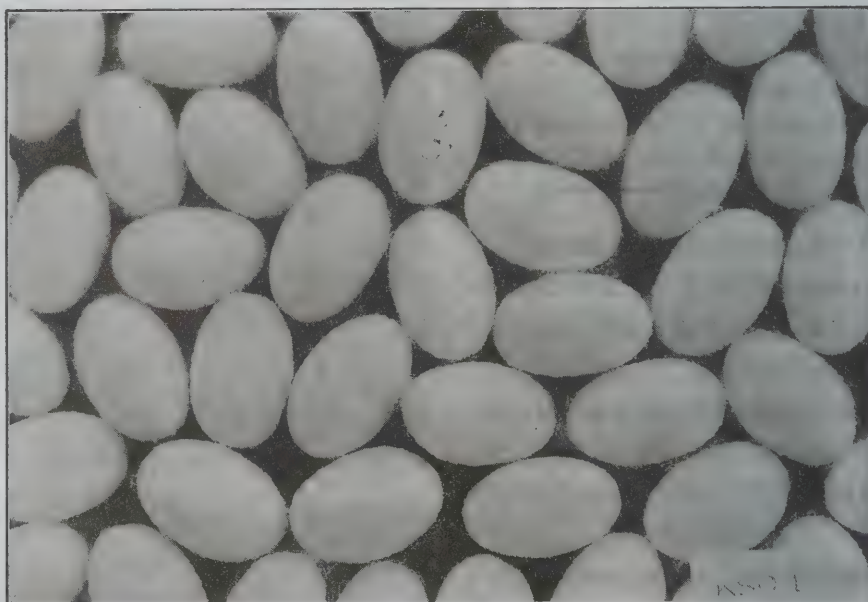
productivity. Bivoltine crop stability and consistency in rearing has not been achieved mainly due to climatic, rearing and socio-economic conditions. This has necessitated evolution of bivoltine silkworm races sustaining such conditions enabling acceptance by the farmers, facilitating increased bivoltine cocoon and gradable raw silk production paving way for more export of products facilitating improvement in the socio-economic conditions.

### New bivoltine races

Breeding experiments were initiated in Karnataka State Sericulture Research and Development Institute (KSSRDI) to evolve hardy bivoltine silkworm races suited to

tropical conditions for achieving the primary objective of establish-

ing bivoltine hybrids as a concept among the sericulturists. Considering the poor performance of bivoltines during summer season, emphasis was given to evolve races suited to high temperature and medium input conditions. Races from the germplasm bank were evaluated for their performance during different seasons, enabling identification of suitable races with emphasis on survival rate under moderate inputs. Three new bivoltine races viz., NP<sub>2</sub>, SP<sub>2</sub> and KSO<sub>1</sub> were evolved involving Pure Mysore- a multivoltine, adopting

**Fig. 3. Cocoons of KSO<sub>1</sub>****Table 2. Characters of new bivoltine races and their hybrids**

Characters	NP <sub>2</sub>	SP <sub>2</sub>	KSO <sub>1</sub>	NP <sub>2</sub> X KSO <sub>1</sub>	SP <sub>2</sub> X KSO <sub>1</sub>	KSO <sub>1</sub> X NP <sub>2</sub>	KSO-1 X SP <sub>2</sub>
No. of eggs/dfl	450-500	450-500	450-500	475-525	—	—	—
Larval duration (D:H)	24-26	24-26	24-26	25-26	25-26	25-26	25-26
Weight of fully grown larva (gm)	3.0-3.5	3.0-3.5	3.0-3.8	3.5-4.0	3.5-4.0	3.5-4.0	3.5-4.0
Cocoon yield/ 100 dfls (kg)	45-60	45-60	45-60	55-70	55-70	55-70	55-70
Cocoon weight (gm)	1.4-1.6	1.4-1.6	1.4-1.7	1.6-1.9	1.6-1.9	1.6-1.9	1.6-1.9
Cocoon-shell ratio (%)	19-20	19-20	20-21	20-22	20-22	20-22	20-22
Effective rate of rearing (%)	88-93	88-93	88-93	92-97	92-97	92-97	92-97
Pupation rate (%)	84-91	84-91	84-91	90-95	90-95	90-95	90-95
Renditta	7.0-8.0	7.0-8.0	7.0-8.0	6.5-7.5	6.5-7.5	6.5-7.5	6.5-7.5



**Table 3. Average performance of new bivoltine hybrids and control**

Characters	New bivoltine hybrids				Control		
	NP <sub>2</sub> x KSO-1	SP <sub>2</sub> x KSO-1	KSO-1 x NP <sub>2</sub>	KSO-1 x SP <sub>2</sub>	PM x NB <sub>4</sub> D <sub>2</sub> (A)	NB <sub>7</sub> x NB <sub>18</sub> (B)	KA x NB <sub>4</sub> D <sub>2</sub> (C)
Larval duration (D:H)	24:13	24:12	24:14	24:13	26:20	26:17	26:21
Improvement over control (%)	-8 (A)	- 9 (A)	- 8 (A)	- 9 (A)			
	-8 (B)	- 9 (B)	- 8 (B)	- 9 (B)			
	-8 (C)	- 9 (C)	- 8 (C)	- 9 (C)	-	-	-
Cocoon yield/10000 larvae by number	9,550	9,525	9,550	9,525	9,525	8,950	8,700
Cocoon yield/10000 larvae by weight (kg)	16.50	16.35	16.68	16.30	15.25	14.25	14.13
Single cocoon weight (gm)	1.80	1.78	1.75	1.73	1.60	1.61	1.66
Single shell weight (gm)	0.37	0.36	0.36	0.36	0.27	0.32	0.34
Cocoon-shell ratio (%)	20.6	20.2	20.6	20.8	16.9	19.9	20.5
Cocoon yield/100 dfls (40,000 larvae)							
By number	38,200	38,100	38,200	38,100	38,100	35,800	34,800
By weight (kg)	66.0	65.4	66.7	65.2	61.0	57.0	56.5
Improvement over control (%)	+8 (A)	+ 7 (A)	+ 9 (A)	+ 6 (A)			
	+15 (B)	+14 (B)	+17 (B)	+14 (B)			
	+16 (C)	+15 (C)	+18 (C)	+15 (C)	-	-	-
Effective rate of rearing (%)	95.5	95.3	95.5	95.3	95.3	89.5	87.0
Pupation rate (%)	92.4	93.0	91.3	92.6	93.0	84.0	82.4
Improvement over control (%)	- 1 (A)	0 (A)	- 1 (A)	- 1 (A)			
	+10 (B)	+10 (B)	+8 (B)	+10 (B)			
	+12 (C)	+12 (C)	+10 (C)	+12 (C)	-	-	-
Average filament length (m)	1,020	1,007	970	1,008	633	874	976
Denier	2.2	2.3	2.4	2.2	2.4	2.2	2.3
Renditta	6.9	7.0	6.9	6.8	9.8	7.5	6.9

hybridization and selection method.

Inbreeding was followed applying selection pressure during generations for achieving desirable characters. Stress was given to parameters like eggs per laying, brushing percentage, larval duration, larval weight, cocoon yield, cocoon weight, shell weight, cocoon-shell ratio, effective rate of rearing (ERR), pupation rate, floss content, filament length, denier,

healthiness of larva, cocoon colour/shape etc.

The larvae of NP<sub>2</sub>, SP<sub>2</sub> and KSO<sub>1</sub> are plain, having shorter larval duration (by 1 day compared with existing bivoltine races), resistant to diseases and tolerant to adverse conditions. The cocoons are of white medium size. The cocoon shell is compact with medium grains. NP<sub>2</sub> and SP<sub>2</sub> produce dumbbell cocoons with slight

constriction while KSO<sub>1</sub> produces oval cocoons (Table 1 and Figs. 1-3). These races were subjected to high temperature tolerance test in the laboratory by rearing under high temperature (35±1°C) and low ventilation conditions. The results were promising with reference to ERR (86%, 93% and 90% in NP<sub>2</sub>, SP<sub>2</sub> and KSO<sub>1</sub> compared to 45 to 58% in control. These new races were subsequently

**Table 4. Comparative performance of new bivoltine hybrids and cross-breed in Bangalore (Urban) district**

Parameter	New bivoltine hybrids	Cross-breed (Control)
Quantity of dfls reared	29,502	27,716
No. of farmers	185	138
Quantity of cocoons harvested (kg)	13,201.13	10,550.63
Average cocoon yield/100 dfls (kg)	44.7	38.1
Average rate/kg (Rs.)	153.53	114.92
Farmers with above 30 kg yield (%)	80	80
Larval duration (D:H)	26:16	28:01
Single cocoon weight (gm)	1.76	1.47
Single shell weight (cg)	36.5	25.0
Cocoon shell ratio (%)	20.7	17.0
Absolute silk content (kg)	3.26	2.58
Filament length (m)	980	633
Denier	2.3	2.4
Renditta	6.9	9.0



**Fig. 4. Cocoons of new bivoltine hybrid  $SP_2 \times KSO_1$**

reared in high temperature prevailing areas of Karnataka during summer season (March to May) and the results were encouraging with reference to ERR (78% and 79% in  $NP_2$  and  $SP_2$  compared to 53% and 58% in control).

### New bivoltine hybrids

Hybrid silkworm rearing is in practice in sericulturally advanced countries for many years and combinations suitable for different seasons are being considered. As compared to pure races, the hybrids have the advantages of less mortality, higher cocoon yield, cocoon weight, increased shell weight, increased filament length and more uniform cocoons.

Accordingly, the new races were subjected to combining ability evaluation using the existing and promising bivoltine races. Four new bivoltine hybrid combinations i.e.,  $NP_2 \times KSO_1$ ,  $SP_2 \times KSO_1$ ,  $KSO_1 \times NP_2$  and  $KSO_1 \times SP_2$  were identified for commercial consideration (Figs 4 & 5). Emphasis has been laid on crop stability. The merits of the new hybrids include:

- ☐ higher survival rate (90-95%)
- ☐ shorter larval duration (by 1-2 days)
- ☐ better cocoon weight (1.7g-1.9g)
- ☐ better cocoon-shell ratio (20-22%)
- ☐ lesser melting percentage (3-4%)

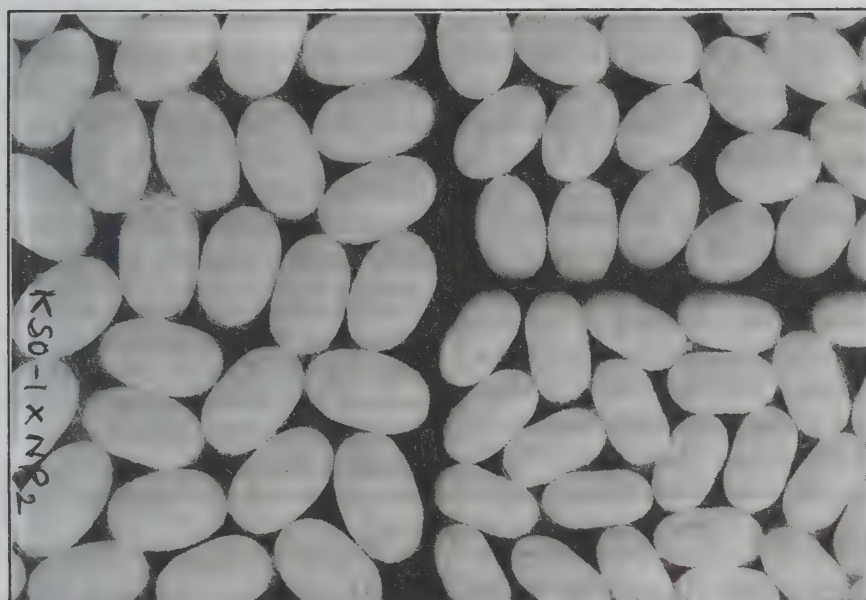
**Table 5. Average performance of new bivoltine hybrids and cross-breed during summer season in Bangalore (Urban) district**

Combination	No. of dfls reared	Larval duration (D:H)	Quantity of cocoons harvested (kg)	Single cocoon wt (gm)	Single shell wt (cg)	Cocoon shell ratio (%)	Average cocoon yield/100 dfls (kg)	Average rate/kg (Rs.)	Renditta
New bivoltine hybrids	16,800	25:02	7,069.03	1.66	34	20.5	42.1	123.15	6.9
Cross-breed (control)	14,730	26:22	5,147.22	1.53	26	17.0	34.9	105.45	9.0



**Table 6. Average performance of new bivoltine hybrids in the field**

District	Quantity of dfls reared	Quantity of cocoons harvested (kg)	Average cocoon yield/100 dfls (kg)	Average rate/kg (Rs.)	Total No. of farmers	No. of farmers with above 40 kg yield/100 dfls	No. of farmers with 30-40 kg yield/100 dfls
Bangalore (Urban)	29,502	13,201.13	44.7	156.89	200	118	42
Tumkur	63,646	20,667.51	32.5	142.00	529	171	190
Mandya	01,371	0,445.98	32.5	141.00	18	7	2
Kolar	30,274	8,975.53	29.6	133.11	261	49	89
Bangalore (Rural)	28,725	8,331.01	29.0	137.49	256	36	95
Hassan	13,329	4,412.93	33.1	128.61	186	80	47
Average	166.847	56,034.09	33.6	139.85 CB: 108.40	1,450	461 (32%)	465 (32%)



**Fig. 5. Cocoons of new bivoltine hybrid KSO<sub>1</sub> X NP<sub>2</sub>**

- ❑ better reelability (80-85%)
- ❑ lower renditta (6.5 to 6.9)
- ❑ good feeding/conversion efficiency with minimum leaf wastage and uniform ripening and easy identification.

The larvae of identified hybrids are plain, and have good resistance to diseases and tolerance to adverse conditions. Cocoon yield and silk content are higher than the ruling multibivoltine hybrid (PM X NB<sub>4</sub>D<sub>2</sub> or PM X NB<sub>18</sub>). The cocoons are uniform with intermediate shape (between dumbbell and oval). The characters of new races and their hybrids

are shown in Table 2.

The new bivoltine hybrids were tested for their high temperature tolerance in the laboratory and found promising. The average performance of new bivoltine hybrids in the laboratory, covering all the seasons, is presented in Table 2. Comparative studies with existing bivoltine hybrids, NB<sub>7</sub> X NB<sub>18</sub>, KA X NB<sub>4</sub>D<sub>2</sub> and multi-bivoltine hybrid (PM X NB<sub>4</sub>D<sub>2</sub>) have shown reduction in larval duration upto 8%, increase in cocoon yield/100 dfls by 18%, increase in ERR by 10% and increase in pupation rate upto 12%

in these new bivoltine hybrids. Renditta is 6.9 (Table 3).

### Field trial in Malnad situation

The new bivoltine hybrids have been tested (sub-station at Melinakuruvally) for their performance under Malnad agro-climatic conditions for two years, covering all the seasons, using multi-bivoltine hybrid (PM X NB<sub>4</sub>D<sub>2</sub>) as control. The new bivoltine hybrids have yielded 61 to 64 kg cocoons compared to 58 kg in multi-bivoltine hybrid per 100 dfls. during summer season. ERR is 94.5-96.0% as against 94.0% in multi-bivoltine hybrid. Filament length is 960-980 m compared to 730 m in multi-bivoltine hybrid.

### Preliminary field evaluation

On completion of evaluation of new hybrids in the laboratory and sub-station, they were subjected to field testing alongwith ruling multi-bivoltine hybrid (cross-breed) as control covering different seasons. Initially, two hybrids i.e., NP<sub>2</sub> X KSO<sub>1</sub> and KSO<sub>1</sub> X NP<sub>2</sub> were tested intensively in the field. Comparative evaluation was taken up in villages covered by Kengeri Technical Service Centre (Bangalore urban district). The performance of the new bivoltine hybrids *vis-a-vis*

cross-breed in respect of important parameters is furnished in Table 3. For rearings of over 29,500 dfls, cocoon yield of 44.7 kg/100dfls, covering all the seasons, as against 38.1 kg for cross-breed has been recorded. The new bivoltine hybrid cocoons fetched an average rate of Rs. 153.53/kg as against Rs. 114.92/kg in cross-breed.

Compared to cross-breed, the larval duration is shorter by two days for the hybrids. The cocoon weight, cocoon-shell weight, cocoon-shell ratio and silk content are also higher. The renditta is 6.9.

The farmers are of the opinion that these new bivoltine hybrids can be easily reared similar to cross-breed, can tolerate adverse conditions, having shorter larval duration, picking of ripe larvae is easy, melting is less and returns are higher. The potential of the new hybrids is as high as 98.5 kg/100 dfls. harvested with maximum rate of Rs. 217.50/kg. The private reelers have recorded bet-

ter reelability and performance over conventional cross-breed and have reported a low renditta of 6.2. Sericulturists are evincing interest based on the advantages of new bivoltine hybrids over traditional cross-breed. The performance of these new bivoltine hybrids and control in the field is presented in Table 4.

The performance of new bivoltine hybrids during summer season in the field is also encouraging. The average cocoon yield/100 dfls during summer season is 42.1 kg as against 34.9 kg in cross-breed. The average rate is Rs. 123.15/kg and Rs. 105.45/kg, respectively. The details of performance during summer season are presented in Table 5.

#### **Intensive field evaluation**

Intensified field testing of the identified new bivoltine hybrids is being done, covering all seasons and in different districts of Tumkur, Hassan, Mandya, Kolar, Bangalore (Urban) and Bangalore (Rural) in Karnataka. Over 1,66,800 dfls

have been tested in the field resulting in harvesting of over 56,000 kg cocoons with an average yield of 33.6 kg/100 dfls. The cocoons of new bivoltine hybrids have fetched an average rate of around Rs. 140/kg as against Rs. 108/kg for cross-breed. The details of performance are presented in Table 6. It is evident from the study that the cocoons of new bivoltine hybrids yield more returns to both farmers and reelers than from cross-breed. Nearly 64% farmers have harvested more than 30 kg cocoons per 100 dfls (Table 5). Sustained and continued efforts would enable establishment of bivoltine hybrids as a concept among sericulturists of tropics with moderate inputs paving way for improved performance and incorporation of more productive races in the years to come.

*The authors are with KSSRDI, Silkworm Breeding Unit, Govt. Silk Farm, Bidadi, Bangalore except the fourth who is with KSSRDI, Thalaghattapura, Bangalore.*

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# Cost-effective Heating System for Chawki Rearing in China

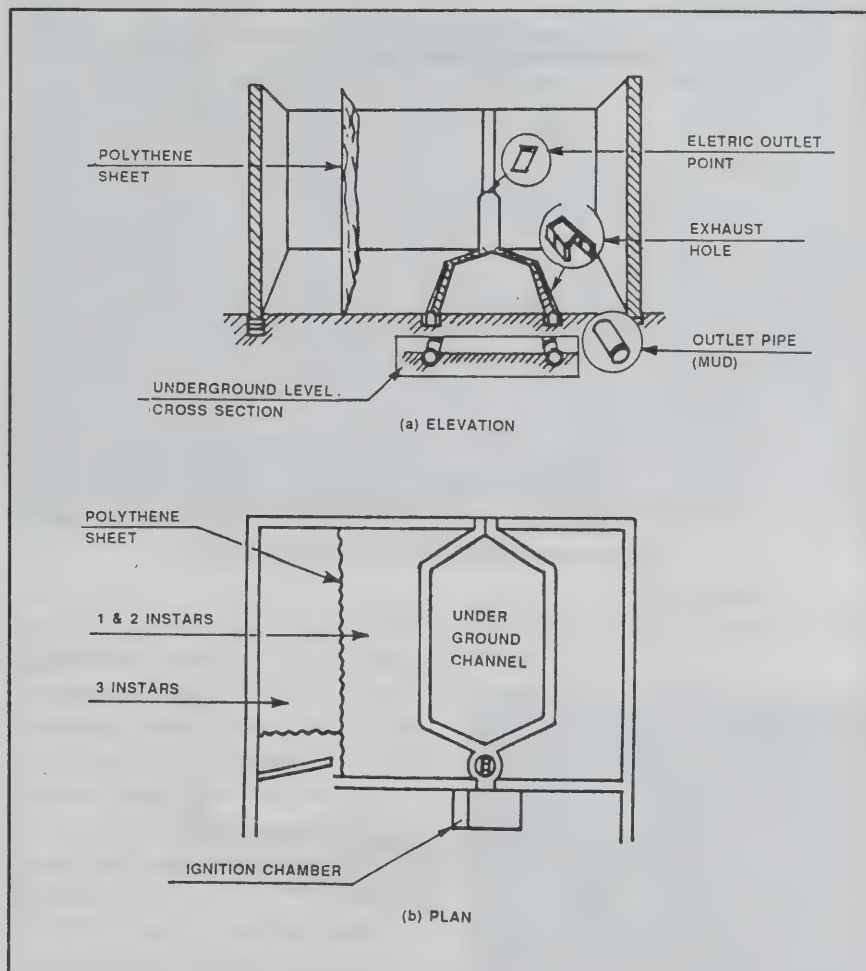
Ch. Satyanarayana Raju, Satish Verma, Mathew John,  
B. Surendra Nath, M.M. Ahsan and R.K. Datta

**I**n countryside of China, the houses are generally residence-cum-rearing houses. The sericulturists, hence, take into consideration the requirements of silkworm rearing while constructing their houses.

It is a fact that preservation of heat and moisture is an important requirement in young age (chawki)

**Success of silkworm crop, especially the chawki, depends much on the maintenance of ideal temperature and humidity conditions in the rearing room. Simple and less expensive systems of heating the rearing room prevalent in China are not only suitable to certain areas of India, but also cost-effective over the existing ones, say the authors.**

silkworm rearing. The sericulture in China fairly falls under temperate climate and hence, heating facilities are a must to maintain ideal temperature in the rearing rooms. Interestingly, the heating systems adopted for sericulture in China are simple and less expen-



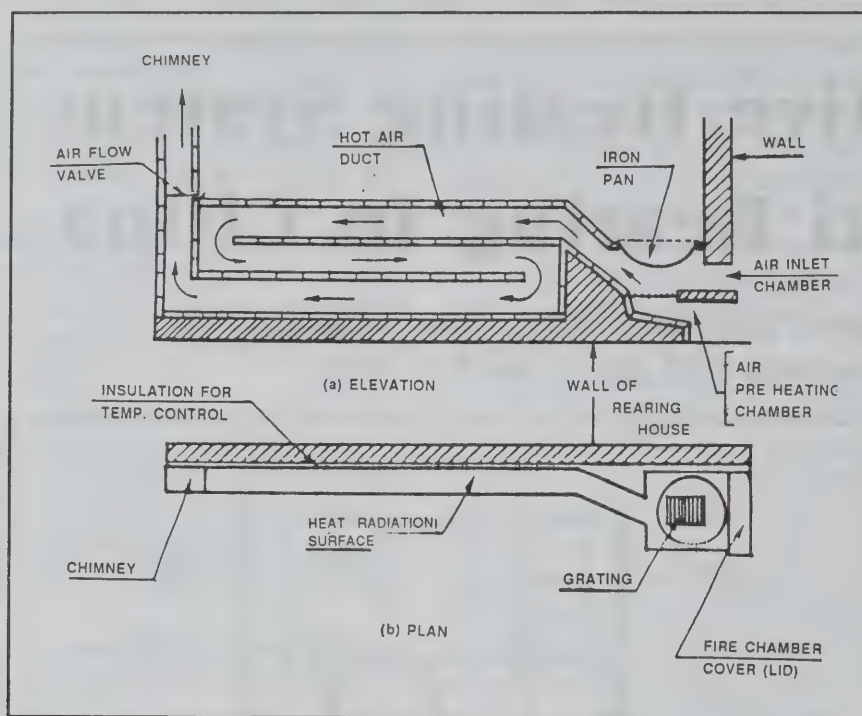
**Heat system-underground channel**

sive. Special rearing rooms with effective heating system are built for young age worms wherever possible. Elsewhere, the rearing rooms are covered with a plastic film to ensure required heat and moisture preservation. Installation of appropriate heating system depends on the type of rearing house (Wang pi Cheng, 1990).

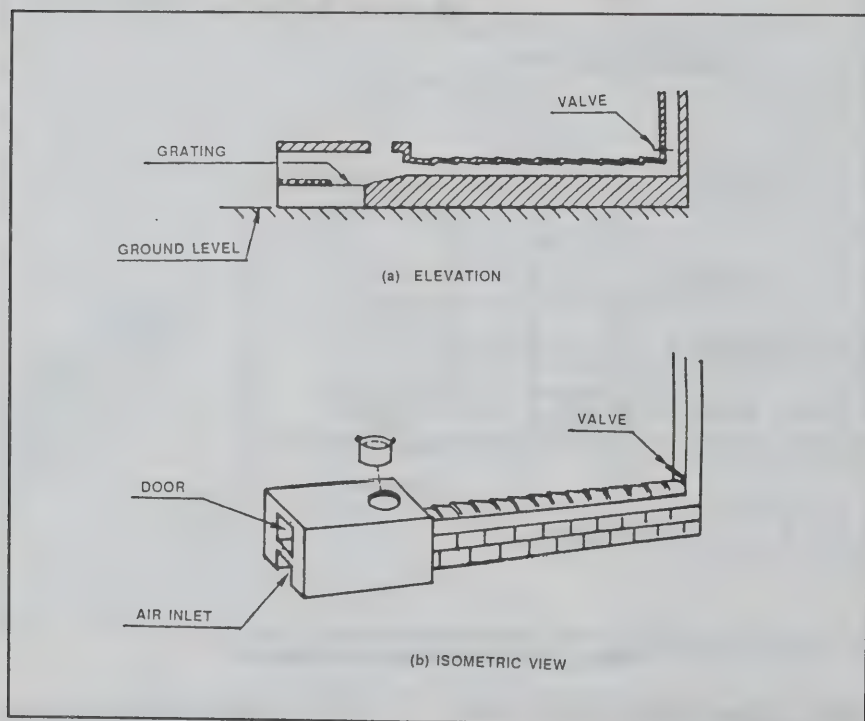
The heating systems in practice in China can be classified into two major categories viz., Floor Heating System and Wall Heating system.

## Floor Heating System

In this system, the air inside the chawki rearing room is heated through radiation of heat energy



**Heat system-cyclic heating facility**



**Heat system-ground heating facility**

with the help of a heat chamber constructed below the floor. Figure 1 depicts the construction details of the system. The room to be heated is partitioned with polythene sheets for creating chambers for different instars of silkworms. The hot air/water

enters the chamber and heats up the floor. The air is heated by fire in the ignition chamber.

This system is found to be safe as it heats the air inside the rearing room uniformly and at a steady rate. Besides, it is very simple in construction.

## Wall Heating System

Here, the air inside the rearing chamber is heated through the walls. Figures 2 and 3 show the construction details of the system. It comprises a fire chamber through which cool air is passed. The air gets heated in the fire chamber as advances through hot air ducts laid along the walls of the rearing chamber.

The air flow in the ducts can be controlled through an air-flow valve. The valve can be regulated for rapid and slow heating. The heat from the wall is radiated in the room. Convection currents also set in the room due to temperature gradient in the heating chamber. Wood, coal and/or mulberry stumps are utilised for heating the air.

Both the systems have been found efficient, cost-effective and safe as only hot air is used to heat the rearing room. These systems are primarily maintenance free except for periodic cleaning of the fire chamber in the first system and the hot air ducts for the carbon deposits in the second.

Chinese farmers use locally available materials for constructing such heating systems and hence, the installation expenditure is kept to the minimum. These heating systems are relevant to the temperate sericultural area/zones in India viz., Jammu & Kashmir, Nilagiri Hills in Tamil Nadu and other cooler areas, as the present methods like use of electric appliances, charcoal burning etc. prevalent in these areas to maintain the required temperature and relative humidity in the chawki rearing rooms are either expensive and/or risky to the silkworms and the rearers as well.

**The first author is with SCPC, Gorantla, Andhra Pradesh, the fourth with CSB, Bangalore and the rest are with CSRTI Mysore.**



# Chestnut for Oak Tasar Silkworm

R.K. Pandey and S.N. Sumbli

**C**hestnut (*Castanea sativa* Miller) is cultivated in orchards of Kashmir valley, Manali (Himachal Pradesh) and Doon valley (Uttar Pradesh), for proteinaceous fruits. It belongs to Oak family, Fagaceae. The impetus for choosing Chestnut leaves for oak tasar silkworm rearing, arose in Kashmir valley due to absence of oak forests there. During eighties, Ahsan *et.al.* had shown that Chestnut leaves can support autumn rearing of oak tasar silkworm.

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***Chestnut, cultivated for its proteinaceous value, can be utilized for rearing oak tasar silkworm as a secondary food plant. The article sheds light on the rearing experiment conducted at RTRS, Batote in Kashmir valley.***

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The rearing of oak tasar silkworm was conducted throughout the growing season in five batches at the Extension Unit of Regional Tasar Research Station, Batote at Akura village (Anantnag) in Kashmir valley by the author during 1982. Rearing was conducted by bringing young shoots of Chestnut completely indoor on water filled earthen pitchers, dur-



Fig. 1. Chestnut - A secondary food plant

ing April, May, July, August and September. Ambient room temperature and relative humidity were recorded four times daily. On consumption of foliage, fresh shoots were attached and consumed shoots were taken out. The room was cleaned daily to remove excreta.

The rearing performance of *Antheraea proylei* (Oak Tasar Silkworm) on *Castanea sativa* in different seasons is presented in Table 1. The most suitable period for brushing was found to be April (Spring season), which provided nearly 60% effective rate of rearing.

There was no difference between the quality of cocoons of spring season obtained from Chestnut and Oak fed rearing. However, rearings of summer,

rainy and autumn seasons were not successful.



Fig. 2. Feeding of Oak tasar silkworm indoor on earthen pitcher

**Table 1. Rearing performance of *Antheraea proylei* on *Castanea sativa* in Kashmir valley.**

Parameters/Season	Spring	Summer	Rainy	Autumn	Late Autumn
Date of Brushing	April 20-22	May 27-29	July 13-15	Aug. 19-21	Sept. 7-9
Hatching (%)	24.6	69.7	68.5	65.0	38.5
Cocoons (Yield/Dfl)	12.6	9.1	0.3	3.9	0.1
E.R.R. (%)	59.3	10.7	0.3	4.3	0.4
Shell Ratio (%)	12.0	11.9	11.9	10.2	10.5
Indoor Temperature (°C)	23.0	25.0	27.0	26.0	23.0
Indoor R.H. (%)	60.0	76.0	84.0	88.0	67.0

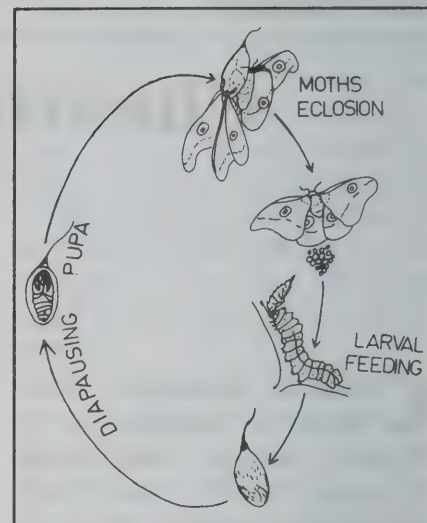
Thus, Chestnut leaves can be used as a secondary food plant for oak tassar silkworm rearing during spring season.

### Primary food plants

Oak tassar silkworm rearing depends on different species of Oak (*Quercus*). It is estimated that 5 and 13 lakh hectares of Oak forests exist in North-western sub-Himalayas and North-eastern

states, respectively. Hooker described 58 species of *Quercus* in his flora of British India in 1890.

Many of the species mentioned in Flora of British India are naturally not occurring in the present boundaries of India. Hooker also treated the genus *Quercus* in the broad sense, which as a matter of fact, consist of 3 genera *Lithocarpus*, *Castanopsis* and



**Fig. 4. Life cycle of Oak tassar silkworm**

*Quercus*. Many of the species of *Quercus* as reported by Hooker have been transferred to the genera *Lithocarpus* and *Castanopsis*. We may today consider only 10 species within Indian boundaries useful for oak tassar culture.

### In North-West

- Q. incana* (New name *Q. leucotrichophora*)
- Q. semecarpifolia*
- Q. dilatata* (New name *Q. himalayana*)
- Q. glauca*

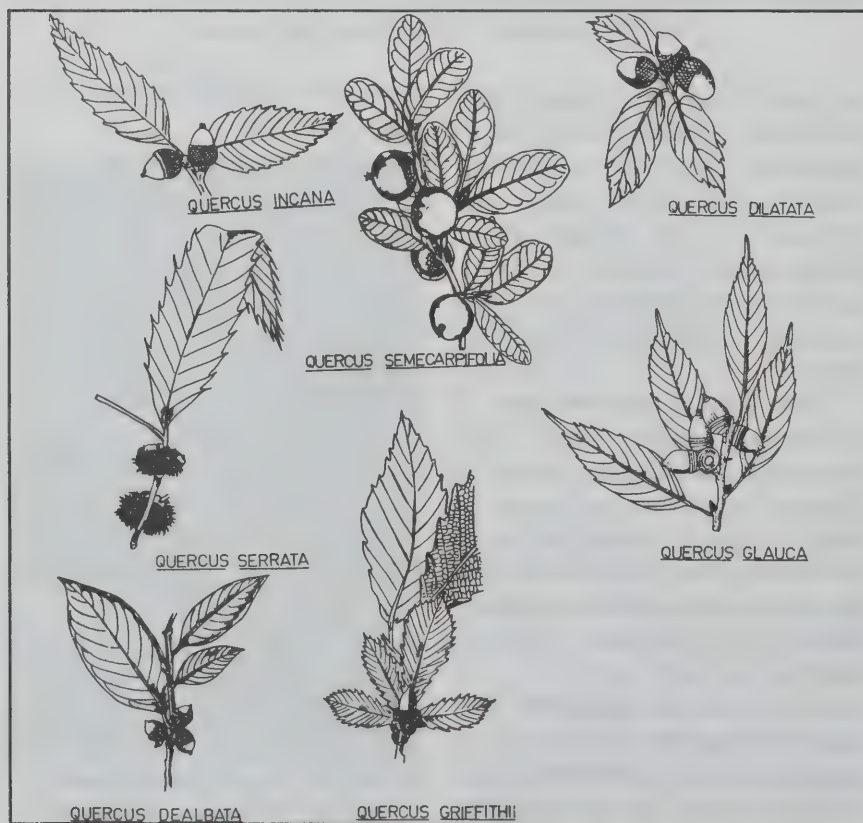
### In North-East

- Q. serrata* (New name *Q. acutissima*)
- Q. semecarpifolia*
- Q. dealbata* (New name *Lithocarpus dealbata*)
- Q. griffithii*

### Climatic variability

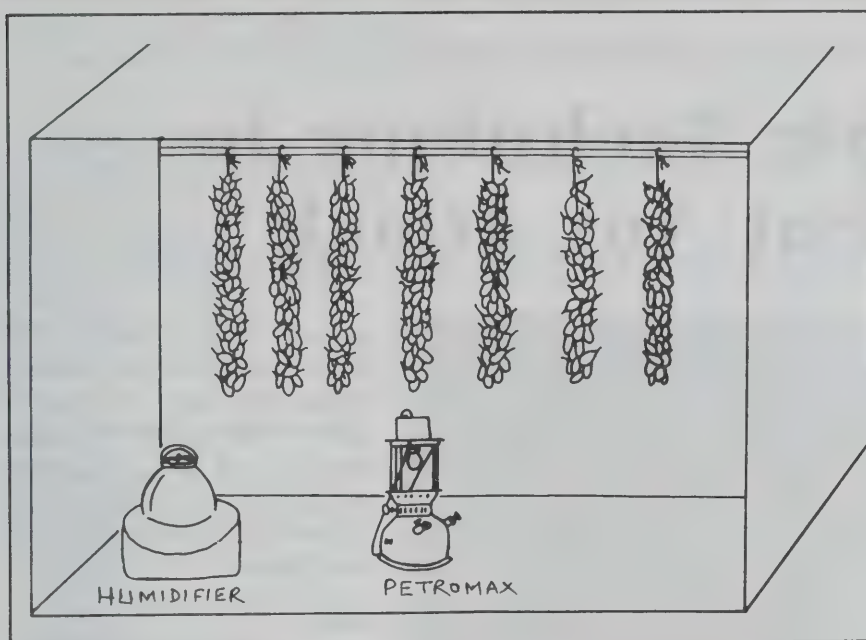
The sub-Himalayan belt of India bounds Jammu and Kashmir in North-west to Manipur in the far North-east, comprising Himachal Pradesh, Uttar Pradesh, Nagaland, Mizoram, Meghalaya, Assam and Arunachal Pradesh.

The topography of these regions is quite different. While, North-western region has high



**Fig. 3. Primary food plants of Oak tassar silkworm**





**Fig. 5. 16 hrs. light treatment to induce moth emergence**

terrains, deep gorges and dense forests, the North-eastern region consists of comparatively low terrains and shallow gorges.

The climate of entire North-eastern region is sub tropical with excessive rainfall and short summer whereas the climate of North-western region is severely cold.

### Altitudinal approach

A *proylei* exhibits bivoltine character but it is difficult to rear second generation at the same location on the same species. This is one of the main problems of oak tasar culture because cocoons from the second crop are used as seed during next spring.

Bahl et. al. had shown that after conducting advanced first crop at low altitude (below 1000 m ASL) on *Q. incana*, a second crop rearing can be successfully carried out at high altitudes (above 2000 m ASL) on *Q. semecarpifolia* in Himachal Pradesh.

Recently, Dhar and Sinha claimed to have raised second crop of Oak Tasar on *Q. semecarpifolia*

in Jammu and Kashmir. One, from the layings of the advanced first crop of low altitude from early sprouting *Q. incana* species. Second, from the layings of *A. pernyi* reared at middle altitudes on *Q. himalayana*. However, inspite of these breakthroughs, the main hindrance for oak tasar culture is the supply of adequate quantity of seed. The altitudinal approach is extremely difficult to manage and practice.

### Rearing technique

Oak tasar silkworm can be reared completely indoor in the North-western as well as in the North-eastern states. But limited household accomodation with the farmers, is coming in the way of this developed technology.

According to Ibohah Singh et. al., farmers can rear these non-mulberry silkworms under nylon net cover on the pollarded tree itself under nylon net cover and earn upto Rs. 6100/- per 1000 gm eggs within 40-45 days.

However, this industry is facing poor survival during summer

and autumn seasons, shortage of industrial seed during spring, low fecundity, poor hatchability, uzy fly in the North-east and loss of seed cocoons during preservation.

### Grainage

The oak tasar silkworm shows diapause in pupal stage. Eclosion of moths from oak tasar seed cocoons depends upon photo period and temperature. Earlier workers employed 16 hrs day light to break the diapause for obtaining layings for an immediate second crop. Conversely, diapause is maintained under short day conditions (8 hrs photo period).

Role of pupal age on fecundity and male potency needs investigation with reference to seed cocoon storage from spring to spring and from spring to autumn.

### Foliage quality

In areas where oak tasar culture is practised and foliage is repeatedly consumed by the oak tasar larvae, it is essential to fertilize the plantation either by soil application of inorganic NPK or by introducing the nitrogen fixing bacteria in the soil around the plants to provide good quality foliage to the larvae.

### Prospects

Although current tasar silk production in our country amounts to only 231 tons, Oak tasar culture provides gainful employment to tribals in the sub-Himalayan India. In high altitude areas above 2000 m ASL, where no other industrial activity can be carried out due to inaccessibility, oak tasar helps earn subsidiary income to the poor tribals of sub-Himalayas.

**First author is working with P.S.D.P., Varanasi and Second with RSRS, Sahaspur, Dehradun, Uttar Pradesh.**

# A Simple Technique to Prevent Ant Attack

**A**nt attack is a major problem particularly to the first and second stage of tasar larvae in most areas of tropical tasar belt. If proper attention is not paid to the early stage worms, it may be eaten away by ants. It is a common practice to apply gammaxene (10% BHC) around the base of the food plant where the tasar larvae have been brushed, to prevent the ants. This system also does not work during rainy season and night time. Moreover, application of 10% BHC on the soil surface is not eco-friendly and now-a-days the use of gammaxene (10%-BHC) is banned. Hence, a new technique has been developed by the Central Tasar Research and Training Institute, Ranchi to control ants which is economical, eco-friendly and dependable.



## Technique

Adhesive paper tape (packing tape) of 2 cm width is wrapped on the tree trunk to act as substratum. 15 gm of Kanoxene (50% BHC WP containing 6.5% gamma

isomer W/W) is mixed in 100 gm of multipurpose grease. Grease-Kanoxene mixture is applied gently on the tape using a rod without leaving any gap. On an average, 7 gm of the mixture is required for each plant.

## Merits

- Protects the tasar silk-worms from ant attack.
- Keeps the soil free from pesticide pollution.
- Microbes and other beneficial insects are not affected thereby safeguarding the natural recycling and humus production.
- Keep the leaves free from residual toxicity of the pesticide applied.
- Curtails pesticide consumption by 99%.

**Report P.J. Mathew, CTR & TI, Ranchi, Bihar.**

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# Effect of Natural Dyes on the Physical Properties of Silk

S.S. Ahmed, A. Gogoi, R. Phukon and N. Gogoi

**An investigation was carried out to find out the effect of natural dyes viz., kamela (*Mallotus phillippinensis*), Indigo (*Indigofera tinctoria*), Turmeric (*Curcuma longa*) and henna (*Lawsonia alba*) on mulberry silk material. From the experiment it was found that general appearance, lustre and texture of kamela dyed fabric was better than other dyed samples. Both indigo and turmeric dyed fabric had found good colour fastness to washing, whereas other samples showed good colour fastness to pressing. As regards, the physical properties, the dyed samples showed increase in fabric count, thickness and weight as well as breaking strength and elongation, while compared with the original one.**

## Introduction

Colour in ancient times was considered a spiritual necessity of equal importance to the physical need of food. So in every civilization from remote ages to the present day, the art of dyeing has played an important part in adding beauty to the world. Dyeing creates coloured patterns on the cloth and gives a new look to fabrics (Dantyagi<sup>1</sup>).

Dyeing makes an important contribution to fabric decoration by many beautiful colours it produces and colour harmonies obtained by combination of various dyeing methods.

Chowdhury<sup>2</sup> reported that in earlier in days silk was dyed with the vegetable dyes which were extracted from plants, such as roots, stems, stalks, foliage, barks, berries and seeds. In the dyeing of silk fabrics the most essential requisite is the fastness of the dye as these fabrics are not laundered or ironed as frequently as other fabrics. The selection of dyes is therefore, very important as dyeing increases the values of silk. Plant dyes are used to a considerable extent all over the world for their fastness and brightness. Hence, the investigator has made an attempt to find out the effect of natural dyes on silk, with the following objects:-

1. Preparation of dyes and their application on silk, and
2. To find out the effect of

natural dyes on physical properties of silk.

## Materials and methods

Mulberry silk materials with plain weave construction was selected for the study. Kamela, Indigo, turmeric and henna were selected as dyes for this study.

## Nomenclature of the sample

Five metre of silk fabric was cut into five equal pieces each measuring one metre in length and one piece was retained as original and named as and the others were named as A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>, and A<sub>4</sub> as indicated in Table 1.

Table 1. Nomenclature of Samples

Sl.No.	Sample	Dye used
1	A <sub>1</sub>	Kamela
2	A <sub>2</sub>	Indigo
3	A <sub>3</sub>	Turmeric
4	A <sub>4</sub>	Henna

## Preparation of kamela dye

The outer portion of seeds which were removed and squeezed well in 2 lit. of water to extract the colouring matter and was strained through the sieve.

## Dyeing procedure

The prepared dye was heated for 5-10 minutes and the material was put in the dye bath and heated for 15 minutes.

Caustic soda and salt were put

in the dye bath the dyeing process was continued for another 20 minutes with continuous stirring. The material was rinsed well in soft running water, dried and ironed. The colour thus obtained was orange.

### Indigo dye preparation

The leaves along with the stem of indigo plant were soaked in water in a copper vessel to ferment. When the leaves and stems decayed and settled as sediment at the bottom, the water was removed and the sedimented leaves and stem were used as a dye.

*Dyeing procedure :* The calculated amount of dye paste was taken in an enamel bowl and required amount of ash solution and rice liquor were added to form the dye solution. The fabric was then immersed in the dye solution and kept for 10 minutes. This process was repeated for 2-3 times a day for one week. Then the dyed fabric was washed in cold water, rinsed and dried. The indigo dye produced a brilliant blue colour.

### Turmeric dye preparation

The required quantity of turmeric was grinded to paste and mixed with water.

*Dyeing procedure:* The dye solution was boiled for 5 minutes and then the wet fabric was put in the dye bath and boiled for 20 minutes. Caustic soda and 5 gm salt were added to the dye bath and boiled for 5 minutes. The remaining 5 gm of salt was added to the dye bath. The fabric was taken out and rinsed in cold water, dried and ironed. The colour obtained was yellow.

### Henna dye preparation

The required amount of henna leaves were crushed and soaked in water and filtered through a piece of cloth. The solution was ready

for dyeing.

*Dyeing procedure :* The dye solution was taken in an enamel bowl and heated for 5-10 minutes. The wet fabric was put in the dye bath and heated for about 10 minutes. Continuous stirring was needed to get even penetration.

The fabric was taken out. Then salt and caustic soda were added to dye bath and stirred well. The fabric was put back to the dye bath and boiled for 20 minutes. The dye bath was allowed to cool and the fabric was taken out, rinsed well in soft running water, dried

**Table 2. Effect of dyes on fabric count (Threads/inch)**

Direction of fabric	Samples				
	A	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>
Warp	108	116	112	115	116
Weft	112	114	116	115	115
% change in warp		+7.4	73.4	+6.4	+7.4
% change in weft		+1.7	+3.5	+2.7	+2.7

**Table 3. Effect of dyes on fabric thickness (mm)**

Aspect	Samples				
	A	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>
Thickness	0.114	0.131	0.152	0.144	0.136
% change in thickness	-	+19.1	+34.5	+26.3	+19.3

**Table 4. Effect of dyes on fabric weight**

Aspect	Samples				
	A	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>
Weight	51.5	55.4	55.9	55	52.3
% change in weight	-	+7.54	+8.54	+6.8	+1.6

**Table 5. Effect of dyes on breaking strength of fabric**

Direction of fabric	Samples				
	A	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>
Warp	311.14	479.80	4180.33	408.71	375.00
Weft	183.63	168.82	210.28	88.50	155.00
% change in warp	-	+54.21	+54.38	+31.36	+20.52
% change in weft	-	-8.07	+14.51	-51.70	+15.60

**Table 6. Effect of dyes on elongation of fabric in (%)**

Direction of fabric	Samples				
	A	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>
Warp	14	17	18	16	20
Weft	21	18	18	19	22
% change in warp	-	+21	+28.5	+14	+43
% change in weft	-	-14.2	-14.2	-9.52	+4.8

Note: (+) ve sign indicates increase (-) ve sign indicates decrease



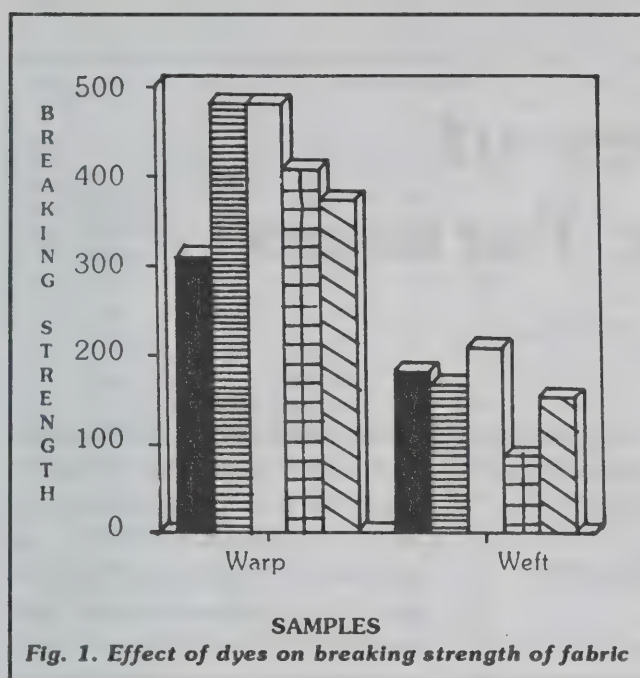


Fig. 1. Effect of dyes on breaking strength of fabric

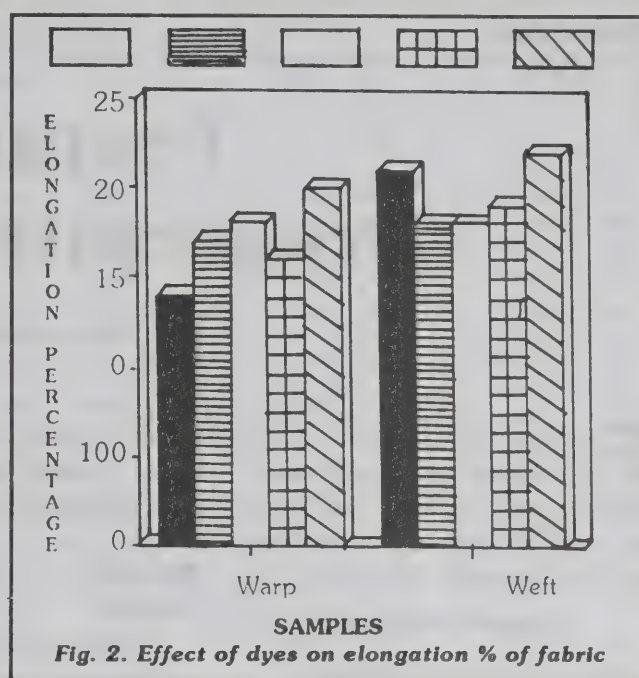


Fig. 2. Effect of dyes on elongation % of fabric

and ironed. The colour obtained from the henna dye was golden brown.

### Finding and discussion

The findings of this study are as follows:

**Effect of dye on fabric count:** From Table 2, it was evident that all the samples have increased in ends and picks/inch compared with the original.

**Effect of dyes on fabric thickness (mm):** From Table 3, it was clear that all the samples have increased their thickness after dyeing.

The increase may be due to the consolidation of yarn during dyeing which increases the count and also due to the absorption of dyes as stated by Chanchal<sup>3</sup>.

**Effect of dyes on fabric weight:** It was observed that the weight of all dyed samples has increased when compared with the original (Table 4) which may be due to the absorption of dyes during dyeing.

**Effect of dyes on breaking strength of fabric:** The breaking strength is the load at which the

specimen breaks, usually expressed in gm weight on pound weight (Booth<sup>4</sup>).

Table 5 indicates the effect of dyes on fabric strength both in warp and weft direction. From the data, it was clear that all the samples showed maximum breaking strength in warp direction. The breaking strength of all the samples increased in warp direction when compared with the original. The present increase in weft direction for sample A<sub>2</sub> was increased while for sample A<sub>1</sub>, A<sub>3</sub> and A<sub>4</sub> showed decrease in strength when compared the original (Fig. 1). Loss in strength in weft direction may be due to the swelling of fibre.

**Effect of dyes on elongation of fabric in (%):** The elongation is the difference between the length of a stretch at breaking load and its initial length usually expressed in percentage.

The results of Table 6 reveals the fabric elongation after dyeing with different natural dyes. Samples A<sub>1</sub>, A<sub>2</sub> and A<sub>3</sub> showed increased elongation in warp direction with the original. But the

sample A<sub>4</sub> increased in both warp and weft directions (Fig. 2).

### Conclusion

The conclusion drawn from the study is that dyeing of mulberry silk with vegetable dyes have pronounced effect. All the four dyes viz., kamela, indigo, turmeric and henna offered even penetration to the fabric. After dyeing, the breaking strength of the silk material has increased in warp direction.

### References :

1. Dantiyagi, S. (1983). Fundamentals of Textiles and their care. 4th edition. Oriental Longman Ltd. New Delhi, pp. 154-161.
2. Choudhury, S.N. (1984). Mulberry Silk Industry, Greham Bazar, Dibrugarh, pp. 232-233.
3. Chanchal, B. (1986). A study of consumer preferences and an assessment of the properties of the fabric produced from textured yarns, Ph.D. Thesis, Anna University, Madras.
4. Booth, J.E. (1968). Principles of Textiles Testing, Hey Wood Book Co. pp.258-259

(Courtesy: Textile Trends)

# Features of Progressive Farmers

B.K. Gupta and Y.K. Gupta

**F**armers to farmers interaction is the best way of communication in extension. The frontline organisations of sericulture, namely Research Extension Cen-

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***Progressive farmers play a vital role in development of sericulture which hinges on adoption of technologies and improved package of practices by the farmers. The extension workers often depend on the vantage position of progressive farmers for effective dissemination of extension messages. The study concerns with the salient features of progressive farmers in a few selected districts of West Bengal.***

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tres (RECs) and Technical Service Centres (TSCs) are always taking help of progressive farmers. Such progressive farmers should have certain qualities, such as belief in

science, desire for improvement, eager to learn, unbiased, dependable, pleasing personality, etc.

## **Necessity of progressive farmers**

All such qualities are not generally available among most of the people. Yet there are persons, though few in number, always think for the development of their brethren. Therefore, the first task of the frontline organisation of sericulture extension is to find out such progressive farmers to adopt improved material and method of sericulture practices.

In villages, there are two types of leaders – one who has authority and the other who has influence. The former generally utilizes the goodwill of the latter. Such leaders are called natural leaders and they have influence among the villagers. Thus, the sericulture extensionists take privilege to approach them for development of the mass through adoption of improved technology. Since sericulture is to some extent different from other agricultural practices, an attempt has been made to characterise progressive farmers involved in sericulture extension.

## **Methodology adopted**

In this study, a total of 82 progressive farmers covering four districts of West Bengal namely,

Malda, Murshidabad, Birbhum and Nadia were considered. In Malda, out of four frontline organisations—REC, Bagmara, TSCs at Mothabari, Kaliachak and Sujapur and 32 progressive farmers were selected. In Murshidabad, 21 progressive farmers were identified by REC, Saktipur and TSC, Panchgram. Similarly in Birbhum, 21 progressive farmers under TSCs at Rampurhat and Bhadrapur were selected. Eight progressive farmers under rearing zone of TSC, Bethuadahri in Nadia district were also taken into account.

Data pertaining to total land, distribution of land in mulberry, paddy and other practices; annual earning from sericulture, agriculture and other practices including animal husbandary were collected. On the basis of the data, percentage of land utilized for mulberry sericulture and income from cocoon crop were assessed.

## **Classification of farmers**

With a view to assess the performance, progressive farmers were classified into six groups on the basis of their educational level. The illiterate farmers are placed under group I while education levels of group II and III are primary and middle class standards, respectively. Others in groups IV and V are non-metric and higher secondary, respectively. The



**Table 1. Performance of Progressive Farmers**

Group	District	Progre- ssive farmers (No.)	Total land (acre)	Distribution of land in acre			Family income (Rs.) from			Annual earnings (Rs.)	Mulberry land (%)	Income from Seri. (%)	Farmers Attended (No.)	Family members in	
				Mulberry	Paddy	Others	Sericulture	Paddy	Others					Total	Working hands
I	Malda	1	1.00	1.00	0.00	0.00	30,000.00	0.00	0.00	30,000.00	100.00	100.00	3.00	5.00	2.00
	Murshidabad	2	3.16	0.40	1.99	0.77	11,500.00	19,500.00	8,200.00	39,200.00	12.65	29.65	18.00	9.00	5.00
	Birbhum	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Nadia	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	3	4.16	1.40	1.99	0.77	41,500.00	19,500.00	8,200.00	69,200.00	33.65	59.97	21.00	14.00	7.00
	Avr/Farmer		1.39	0.47	0.66	0.26	13,633.33	6,500.00	2,733.33	23,066.67	A.A.	A.A.	7.00	4.67	2.33
II	Malda	3	10.00	8.80	1.00	0.20	1,155,000.00	15,000.00	0.00	170,000.00	88.00	91.18	34.00	8.00	9.00
	Murshidabad	1	1.33	0.33	0.66	0.34	9,500.00	7,600.00	4,500.00	21,600.00	24.81	34.98	12.00	4.00	4.00
	Birbhum	1	0.75	0.66	0.09	0.00	28,000.00	6,000.00	0.00	34,000.00	88.00	82.35	11.00	12.00	3.00
	Nadia	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	5	12.08	9.79	1.75	0.54	1,192,500.00	28,600.00	4,500.00	225,600.00	81.04	57.00	57.00	24.00	16.00
	Avr/Farmer		2.42	1.96	0.35	0.11	38,500.00	5,720.00	900.00	45,120.00	A.A.	11.40	11.40	4.80	3.20
III	Malda	4	6.33	2.63	3.17	0.53	59,500.00	79,000.00	5,000.00	143,500.00	41.55	41.46	46.00	17.00	9.00
	Murshidabad	3	7.72	1.36	6.09	0.27	91,750.00	50,500.00	11,400.00	153,650.00	17.62	59.71	44.00	19.00	12.00
	Birbhum	2	1.83	0.83	1.00	0.00	21,000.00	6,500.00	0.00	27,500.00	45.35	76.36	18.00	6.00	5.00
	Nadia	1	0.42	0.42	0.00	0.00	20,000.00	0.00	0.00	20,000.00	100.00	100.00	25.00	5.00	5.00
	Total	10	16.30	5.24	10.26	0.80	192,250.00	136,000.00	16,400.00	344,650.00	32.15	55.78	133.00	47.00	31.00
	Avr/Farmer		1.63	0.52	1.02	0.08	19,225.00	13,600.00	1,640.00	34,465.00	A.A.	A.A.	13.30	4.70	3.10
IV	Malda	6	19.99	4.96	11.19	3.84	137,000.00	127,000.00	27,000.00	291,000.00	24.81	47.08	70.00	19.00	16.00
	Murshidabad	4	11.17	2.07	8.68	0.42	36,800.00	59,500.00	7,100.00	103,400.00	18.53	35.53	59.00	26.00	15.00
	Birbhum	7	33.67	10.32	17.99	5.36	310,900.00	83,500.00	0.00	294,400.00	30.65	78.83	87.00	44.00	30.00
	Nadia	4	5.58	3.91	1.33	0.34	123,700.00	60,000.00	49,000.00	232,700.00	70.07	53.16	46.00	26.00	6.00
	Total	21	70.41	21.26	38.19	9.96	608,400.00	330,000.00	83,100.00	921,500.00	30.19	59.56	262.00	115.00	67.00
	Avr/Farmer		3.35	1.01	1.86	0.47	28,971.43	15,714.29	3,957.14	43,880.95	A.A.	A.A.	12.48	5.48	3.19
V	Malda	12	39.75	11.48	22.61	5.66	347,000.00	161,000.00	25,000.00	533,000.00	28.88	65.10	144.00	62.00	29.00
	Murshidabad	10	22.99	4.78	17.24	0.97	222,300.00	114,000.00	18,800.00	355,100.00	19.96	62.60	135.00	51.00	33.00
	Birbhum	10	55.33	12.98	36.68	5.67	416,000.00	117,900.00	0.00	533,900.00	23.46	77.92	94.00	88.00	59.00
	Nadia	3	6.55	3.18	3.17	0.50	94,000.00	177,200.00	31,500.00	302,700.00	46.42	31.05	65.00	15.00	5.00
	Total	35	124.92	32.42	79.70	12.80	1,079,300.00	570,100.00	75,300.00	1,724,700.00	25.95	62.58	438.00	216.00	126.00
	Avr/Farmer		3.57	0.93	2.78	0.37	30,837.14	16,288.57	2,151.43	49,277.14	A.A.	A.A.	12.51	6.17	3.60
VI	Malda	6	18.76	8.74	8.17	1.85	235,000.00	75,000.00	9,000.00	319,000.00	46.59	73.67	57.00	21.00	16.00
	Murshidabad	1	8.00	1.00	7.00	0.00	26,000.00	15,000.00	500.00	41,500.00	12.50	62.65	20.00	4.00	4.00
	Birbhum	1	1.67	1.00	0.67	0.00	32,000.00	7,000.00	0.00	39,000.00	59.88	88.05	10.00	6.00	5.00
	Nadia	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	8	28.43	10.74	15.84	1.85	293,000.00	97,000.00	9,500.00	399,500.00	37.78	73.34	87.00	31.00	25.00
	Avr/Farmer		3.55	1.34	1.98	0.23	36,625.00	12,125.00	1,187.50	49,937.50	A.A.	A.A.	10.88	3.88	3.13
Group - I : Illiterate, Group - II : Primary, Group - III : Middle Class, Group - IV : Non-Matric, Group V : S.F. & H.S. pass, Group - VI : Graduates, A.A. : As above															

Group - I : Illiterate, Group - II : Primary, Group - III : Middle Class, Group - IV : Non-Matric, Group V : S.F. & H.S. pass, Group - VI : Graduates, A.A. : As above

progressive farmers belonging to group VI are graduates.

### Assessment of performances

It is interesting to note that these progressive farmers, in general, distribute their total land among various practices, such as mulberry sericulture, paddy, etc to increase their earnings. But only in Malda, Md. Mustaque Shek utilises his entire one acre land for mulberry cultivation and earns an

income of Rs. 30,000/- per year.

It is worth to mention that all progressive farmers are able to enhance their earning by sericulture and its associated technologies. Their average investment of land in sericulture varies from 25.95 (Group-V) to 81.04% (Group-II) and the earnings from sericulture is better than other crops. Their average earnings from sericulture range from 55.78 (Group-III) to 73.34% (Group-VI)

of the annual income.

From their annual income, it is clear that all the progressive farmers are economically better as the average annual earnings of Groups - I, II, III, IV, V and VI are Rs. 23066.67, Rs. 45120.00, Rs. 34465.00, Rs. 43880.95, Rs. 49277.14 and Rs. 49937.50, respectively. Thus, the pecuniary condition of Groups IV, V and VI is better than that of Groups I and III. Further, the annual earnings of

progressive farmers of Group II is more (Rs. 45120.00) because they invested maximum land (1.96 acre) in mulberry sericulture than any of the groups.

As regards their family structure, it is to be pointed out that the average number of family members varies from 4 to 6 while the number of working hands is around three. It is to be highlighted that except Group I (illiterate) the other groups (literate class) are found more effective in motivation which can be seen from the Table. It is further to be pointed out that literate progressive farmers of Group III are more effective in sericulture extension followed by Group V and IV. The above findings help us select progressive farmers to a great extent.

### Criteria for selection

Based on the above study, it is possible to select progressive farmers and their criteria should be :

- Minimum Middle Class pass and more than Higher Secondary pass is not essential.
- Possessing sufficient lands.
- Interested to adopt improved materials and methods.
- Having sufficient working hands in the family.
- Not below poverty line and annual income should be around Rs. 30,000.
- Capable of recording progress and problems of his fellow beings and can express without bias.
- Moving fast and taking decision properly.

**The authors are with Central Sericultural Research and Training Institute, Berhampore, West Bengal.**

SERI PUBLICATIONS			
Sl. No.	Title	Language	Price Rs.
1.	<b>Hand Book of Practical Sericulture</b> (Comprehensive book on mulberry sericulture and useful guide to new entrants and sericulture students)	English, Hindi	50.00
2.	<b>Manual on Silkworm Egg Production</b> (Comprehensive book on scientific techniques of production of quality and disease free silkworm eggs. Useful guide for new graners and sericulture students)	English	40.00
3.	<b>Hand Book of Muga Culture</b> (Introductory booklet with detailed information on the golden yellow "Muga Silk" of Assam)	English	10.00
4.	<b>Ericulture in India</b> (A useful dossier on the wild silk, eri and its culture)	English	10.00
5.	<b>CSR &amp; TI (Mysore) Bulletins on improved practices of sericulture</b> a. Mulberry Cultivation in South India b. New Technology of Silkworm Rearing c. Improved Methods of Rearing Young Age (Chawki) Silkworms [Simple and descriptive bulletin with practical tips. Highly useful for new sericulturist.]	Hindi	9.00 (per set)
6.	<b>Guidelines for Bivoltine Rearing</b> (Colourful and pictorial booklet of do's and don'ts on bivoltine silkworm rearing)	English, Hindi, Kannada, Marathi, Oriya, Bengali, Punjabi, Assamese, Urdu, Gujarathi, Kashmiri	10.00
7.	<b>Tips to Successful Silkworm Cocoon Crops</b> (Pictorial booklet of do's and don'ts of scientific and correct methods of silkworm rearing)	English, Kannada, Marathi, Oriya, Bengali, Punjabi, Assamese, Urdu, Gujarathi, Kashmiri, Malayalam, Tamil, Telugu, Hindi	2.00
For copies, write with advance payment by MO/DD (No VPP please) to : The Member Secretary, Central Silk Board, CSB Complex, B.T.M. Layout, Madivala, Bangalore-560 068			



# Venkatesh Babu: *An Epitome of Success*

T.V. Vathsala



*Busy workers at grainage*

**D**harmapuri in Salem district of Tamil Nadu is one of the busiest towns bubbling with sericulture activities. It is here that Shri R.Venkatesh Babu who represents the entire gamut of sericulture industry runs, a one man show by actively involving himself in the activities of the grainage, reeling, twisting, weaving and also sales of sericulture accessories. Though Babu began his career in sericulture as a reeler, he has been functioning as a recognised granear also.

**Grainage:** Shri Mahalakshmi grainage at Dharmapuri is one of the leading grainages in the district. Under the ownership of Babu, this grainage started functioning in 1990. This grainage is reputed for the supply of quality eggs and has a 9 member team

amongst whom 5 employees are exclusively in the extension wing. Shri Narayanappa, one of the Senior-most members of the extension staff, has an experience of 35 years in the field of sericulture.

Extension staff visit the farmer's fields to know the problems of their customs with regard to the supply of eggs. They meet every Sunday to discuss the problems. Once in three months the extension staff hold a meeting with the rearers to discuss the problems. Each extension worker is allotted an area to study their customer problems subjected to the interchanges in the area of operation every month. Sometimes the farmers themselves come to the grainage with problems. Extension workers advise these farmers regarding proper method



**Shri R.Venkatesh Babu, son of Shri S.Raju, is an young man of 34 years, bubbling with enthusiasm and runs a one-man show in the field of sericulture and silk industry. A first class degree holder from the University of Madras, Babu passed his B.Sc. in Applied Science in the year 1983. Mother tongue being Telugu, he is also well-versed in Tamil and English. His uncle Shri Muni venkatappa, Joint Director, DOS, Karnataka, was the person behind to inspire Babu in the field of sericulture. After beginning his career as a reeler in the field of sericulture in 1980, Babu has never looked back. Today, he is a roaring business man with annual profit of around Rs.3-4 lakh. "Hard work yields marvellous results"-sincerely advises Babu to the budding entrepreneurs.**

of rearing and also provide information as to how to overcome these problems.

**Purchase of seed cocoons :** Programme for purchase of seed cocoons is chalked out three months in advance. Accordingly, an indent is placed before the Department of Sericulture (DOS), Tamil Nadu. Cocoons are



supplied from the government cocoon market at Dharmapuri. Generally, the indented cocoons are supplied and there is no problem of short supply. In case of shortage, the DOS will issue a no objection certificate to buy cocoons from Karnataka or any other desired place. Yet, Babu is slightly discontent with the allotment procedure wherein first preference is given to government agencies rather than LSPs unlike DOS, Karnataka. As a result LSPs should be satisfied with the left overs. It is due to this reason that

for its cross breed cocoons. Hence area-wise analysis is made before the purchase of cocoons.

**Hygiene:** After every disinfection only two batches are reared. Only one batch with the production of 20-25 thousand eggs are reared at a time. The inside and outside area of the grainage is cleaned daily with the bleaching powder. Fumigation method is followed to maintain hygiene in the grainage. Egg sheets are washed in 2% formalin. An ideal temperature of 23-25° C and humidity of 75-80% is maintained in



**Twisting at full swing**

is decided upon. Thus to improve the quality of silkworm eggs, sex separation is conducted in seed cocoons.

A moth testing register is maintained and DOS, Tamil Nadu, certifies each batch and it is only after certification, eggs are released to the farmers from this grainage. Generally, there are no problems regarding seed cocoons. In case of any problems Deputy Director (Seed Organisation) DOS, Hosur, will assist the LSPs in solving the problem. The office holds a meeting every month to discuss the problems of LSPs and problematic eggs from Mahalakshmi Grainage will be replaced in case of complaint.



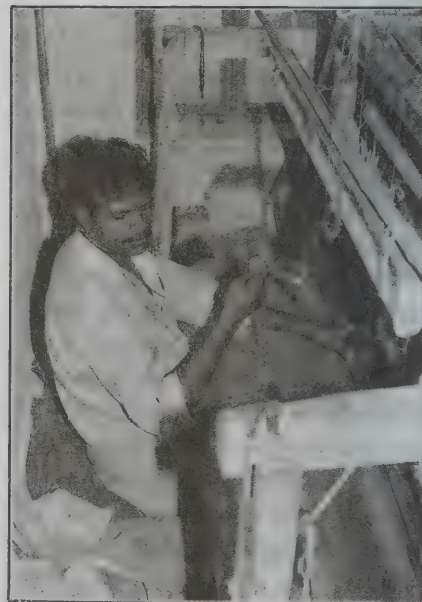
**Re-reeling in progress**

Babu intends to develop parental race so that he can assure his customers of 100% quality seed. A proposal, in this regard is also submitted to the Central Silk Board.

**Selection of cocoons:** Before purchasing cocoons, background information on that particular batch of cocoons is obtained, besides information on source of purchase, problems in that particular seed area, stages at which problems are found and also the problems faced with that particular batch. Advantages from that particular seed area are taken into consideration. For example, D.G.Doddi is known

the grainage. An a/c room is provided for oviposition. Centrifuge is used for mother moth examination. Each batch is tested for pebrine during mother moth examination. Babu proudly announces that since 1992 (i.e., Sept-Oct.'96 batch) no batch has been discarded due to pebrine incidence. He, however, accepts that a few batches are faced with other problems of flacherie disease. A few cocoons are also discarded for poor quality.

Generally Babu uses weighing pan method for sex separation. A lot is taken and based on the mean weight of the moth male or female



**Weaving a design**



Generally Babu creates an awareness among the rearers regarding hygiene and negligence of which leads to crop failures. In case of crop failures after getting layings from his grainage, he sometimes personally visits the field, tries to analyse and solve the rearer's problems. Babu's main concentration for distribution of layings is in and around Dharmapuri and he intends to develop parental seed to obtain quality eggs. Rejected or waste cocoons from grainage are also utilised in reeling. This has added to the economics of grainage as well as reeling unit. This is also one of the secrets of Babu's success in the field of sericulture. Babu feels that "it is high time to enlighten the farmers on region and season specific crops to obtain better yield".

**Reeling:** Under the banner, "Raju Reeling Unit", it has bagged the best district level reeling unit award for the year 1981-82 and also a gold medal for being the best reeling unit in the region as well as the state issued by the government of Tamil Nadu for the year 1984-85.

The unit started with 6 basins

and today it is functioning with 12 basins.

In 1980 itself a family of 15-20 labourers from a place near Kollegal of Mysore district in Karnataka were brought to Dharmapuri to work in this unit. The reason he feels is that "the reelers from Karnataka, perform better". These employees are provided with accommodation, medical and other facilities.

About 150 kg. of multivoltine cocoons are purchased from the government cocoon market at Dharmapuri for his reeling unit. He reels yarn of 10-10.5 renditta and 16/18 denier and produces on an average 14-15 kg of yarn per day from 12 basins. Cocoon wastage is only about 3%. When there is breakage, it certainly affects twisting and weaving. Therefore, every care is taken to maintain quality while reeling.

"When licenses are issued irratically to reelers, scarcity for reeling cocoons is created which results in bidding and unhealthy competition. To overcome this problem, government should act as an intermediary agency by purchasing quality cocoons at a reasonable price and selling the

same to the reelers at a competitive rates. Apart from that DOS, Tamil nadu should establish a cold storage at Dharmapuri to store stifled cocoons and ensure uninterrupted supply of reeling cocoons. This avoids unhealthy competition amongst the cocoon buyers and sellers as the government fixes reasonable rates to buy and sell the cocoons", says Babu.

Multivoltine males and bivoltine female cocoons are used for reeling as they are not suitable for egg production. Unused seed cocoons are separated before the emergence of moth and used in the reeling unit for production of silk yarn.

**Twisting:** Venkatesh Babu's twisting unit started functioning in 1983 with 360 spindles and now it is 3000 spindles. A-24 hour running unit twists around 20-30 kg of silkyarn per day.

Twisted yarn is sold to Tamil Nadu Silk Federation, Government of Tamil Nadu and also TANSILK and the supply is as per the indent. Apart from that he also sells the yarn to private weavers, a sales depot at Salem is also functioning. Marketing area for twisted yarn also includes places like Khumbakonam and Coimbatore.

Babu uses only .01% of twisted yarn produced and the rest is sold to the cooperative sectors for weaving.

**Weaving:** A two year old weaving centre is situated at Parigam village, some 22 km. away from Dharmapuri. Here 7 looms are functioning with 10 members of a family weaving on it.

One Kancheevaram handloom saree can be woven in a week from a single handloom. We weave 30 sarees per month from 7 looms i.e. @ 3-4 sarees per loom in a month. He intends to start



*Proud display of intricate designs*

(Contd on page 35)

# XXI ISA Congress in Bangkok

The XXI Congress of International Silk Association (ISA) was successfully concluded in Bangkok on 7th November 1997. The congress was attended by 135 delegates, representing 22 silk producing and consuming countries/regions including Uzbekistan for the first time. The congress also welcomed observers from ITC (UN, Geneva), UNIDO (UN Vienna), ESCAP (UN Bangkok) and FAO (UN Bangkok).

The numerous meetings took place in a very positive and cordial spirit. Despite the difficulties the silk industry is going through at the moment, ISA's members showed their willingness to cooperate with a view to improving the situation.

The central theme of the congress, promotion, figured prominently in many of the meetings. Some of the European members put forward a concrete proposal for a levy on Chinese raw silk, intended to finance research into quality and to set up a fund for the promotion of silk. The Chairman of the China National Silk Import & Export Corporation, Mr. Chen Youzhe, expressed his support for the idea of promoting silk business but expressed his disagreement with a method of collection based solely on raw-silk producers, which is qualified as 'neither workable nor reasonable'. Mr. Chen recalled that CNSIEC is involved in buying and selling, but not in production, consequently the Corporation is unable to organise such a collection. On the other hand, the Corporation is thoroughly acquainted with the contracts passed between exporters and importers. Mr. Chen's proposal is therefore to set

aside a certain percentage of the value of these contracts, the same amount for both the exporter and the importer, in order to finance promotion. At the beginning, the amount of money thus collected for promotion may be small, but if the initial results are promising the percentage could be increased.

Speaking on behalf of the European authors of the original proposal for a levy of \$1 per kilo on Chinese raw silk, Mr. Schwarzenbach thanked Mr. Chen for his remarks and for his recognition of the need for promotion. He underlined the progress made in this area, in particular the idea of setting up an ISA 'think-tank' on promotion, bringing in not only Europe and China, but other major silk countries such as India, Japan, Korea, Brazil. Mr. Schwarzenbach stressed the need for prompt action because the competitors of silk, whose financial weight is much greater, are gaining ground every year to the detriment of silk.

The resolutions and recommendations adopted by the various Sections and Committees are as follows :

## Section I/II

### *Recommendations*

- ◆ The producing-countries will do their best to supply high-quality cocoons and raw silk to the consuming countries in keeping with their needs, all the more so under the severe economic conditions prevailing in the industry.
- ◆ The ISA and the International Sericultural Commission should continue to assist in the im-

provement of silkworm rearing and silk reeling in the developing countries so that these countries can produce high-quality cocoons and raw silk.

- ◆ Silk is a natural fibre. Consumer-countries much consider all the difficulties involved in its production and accept the quality of silk which it is actually possible to produce and not except a perfect fibre.
- ◆ To contribute to the great efforts which the producer-countries are making, the consumer-countries are invited to explain their problems in detail whenever they raise problems of quality. Clarifying the problems as well as pointing out the technical solutions are very helpful in solving them.

## Section III

### *Conclusions*

The silk business worldwide must be looked at as one organism within which the maintenance of certain checks and balances is important. It is necessary to vigorously continue the efforts to improve the conditions in all domains which may be summarised as 'orderly marketing' without going into the details of this very complex subject. It is recognised that the scaling-down of reeling capacities, notably in China but also in other producing countries, is a matter of great sacrifices for the producers in terms of finance costs and social problems. In China, a plan further reduction of reeling capacities to balance supply and demand is in force.

It is recognised that silk is



encountering an image problem in the markets of western-style clothing when it competes with other fibres and where its unique properties are now consistently ignored. The loss of image and the consequent neglect of silk by many leading fashion makers should be halted and reversed with joint efforts by both sides, producers and users. To that end, the implementation of orderly marketing of silk is a central requirement. It is felt that in this concept of orderly marketing, the capacities of the traditional traders should be used to stabilise market conditions. The restoration of orderly marketing conditions forms the basis for an effective promotion and final stimulation of demand. The funding of such a promotion scheme continues to be the object of study and joint consultations between producer and user countries.

In the traditional silk-producing countries of Asia, where silk is by tradition cherished and loved with a respect which goes beyond sartorial or practical considerations, the share of imports rises. The domestic markets of India, Japan and South Korea in consequence are more and more easily affected by external factors. Orderly marketing, also for them, is an important key requirement. In Japan, the control of supply and demand by China through careful monitoring of the market prices is considered a good measure to achieve the goal of orderly marketing and further measures are hoped for.

It is recommended that the newly revised International Trade Rules (1997) for Raw Silk be widely used as a standard and reference basis for the dealings in a variety of silk products. Ultimately, the silk business can only survive if all of those engaged in it can earn a profit. A prospering silk business

will be a sign of harmony between different cultures and traditions, undoubtedly a goal which all of us feel important and worthwhile striving for.

#### Section IV

##### *Conclusions*

- ◆ The lasting shortage of silk wastes makes evident a structural over-capacity in spinning factories, in parallel with over-capacity in filatures (except for India and Brazil). An estimated 33% of them, due to specialised, non-convertible plants and machines, will be forced to go definitively out of the market, with notable economic and social problems, in the next two years.
- ◆ The present demand for spun-silk yarn is not bad, compared with the availability of the product.
- ◆ The demand for silk noils and silk-noil yarn is weak. There are stocks of both of them.

#### Section V

##### *Resolutions*

- ◆ Classification of undegummed thrown-silk warp yarns : with a group of members of Section V (to be found in different countries), deliver to the Swiss task force of the SSC within one year, the following information.
  - a list of which properties should be tested
  - a list of the importance of each of these points
  - as many test results of undegummed thrown-silk warp yarns as available.
- ◆ Quality of raw silk : asking the producing countries to keep the best qualities of their raw silk to be sold to those who traditionally make the highest qualities of thrown silk.
- ◆ Sizes of raw-silk lots : asking

the producing countries to continue their efforts to deliver homogeneous raw-silk lots of 600 kg.

- ◆ Arbitration in case of disputes: preparing for the next Congress a list of three names of silk specialists (persons or institutions) who shall in future be accepted as arbitration bodies in case of a dispute between parties not able to find a solution in common talks. This list shall then be submitted to Section VI (weaving and knitting) and Section VII (dyeing, printing, finishing) for approval.

#### Section VI

##### *Recommendations*

- ◆ All markets be open to the free circulation of silk goods.
- ◆ It considers very important that all manufactures of silk articles calculate an adequate added value when fixing the price of their products so as not to create disturbances and confusion on the markets.
- ◆ The study of a project for the worldwide revival of the image of silk and for giving a new dynamism to silk demand.
- ◆ We consider that the European ideas presented in Hangzhou at the Sino-European meeting and explained during this congress constitute a positive step towards this objective.
- ◆ A resume of Mr. Ratti's proposition, made by Mr. Pierre Schewarzenbach, will be submitted to the delegations for better information.
- ◆ We propose that the Executive Committee set-up a working group with the participation of Europe, China and, if possible, Korea, Brazil, India and Japan (with a limited number of participants) in order to find a unanimously acceptable project.

## Section VII

### *Recommendations*

- ◆ To continue research into conditions in each market on its standard requirements and demands.
- ◆ To continue to initiate and collate research into the properties of silks as a furnishing fabric, with the purpose of sharing information and developing common standards.
- ◆ To find ways where possible to improve the performance of silk as a furnishing fabric.
- ◆ To coordinate, when and where appropriate, lobbying on national governments, regional authorities and international institutions regarding legislation which may restrict the use of silk as a furnishing fabric.
- ◆ To educate the suppliers and weavers on their needs and the issues of the furnishing market.
- ◆ To recommend that these suppliers and weavers of silk in turn take the responsibility of educating their customers on how best to apply and utilise silk for furnishings.
- ◆ To continue to create a worldwide network of suppliers of silk furnishing fabrics, to encourage further development, specialisation in and further usage of silk as a furnishing fabric.
- ◆ To gain new members who will expand the role and the scope of ISA.
- ◆ To continue to support and develop the ad-hoc technical sub-group of Section VII, under the chairmanship of our Deputy Chairman, Dr. Ettore Bianchi, to develop recommended minimum standards with regard to light fastness (sunlight and artificial light), rotting, abrasion, pilling,

colour-fastness and fire-retardancy with respect to upholstery, curtains, bed-covers and wall coverings. The technical sub-group should set priorities and the agenda for technical development and research and report back to Section VII at the XXII Congress.

- ◆ To recommend to national delegates and national organisations to form national furnishing fabrics sections from companies in all aspects of silk for furnishing fabrics.
- ◆ The ISA Executive should formulate a nominal membership-fee to encourage editors of furnishing fabrics to join ISA.
- ◆ Further promotional and information meetings should be held at furnishing-fabrics exhibitions.
- ◆ To work with the Standing Executive Committee to create relationships with dye stuffs associations and companies and to encourage them for improving the dyeing properties of silk as a furnishing fabric.

## Section VIII

No recommendations or resolutions.

## Section X

### *Conclusions*

- ◆ Section X should revive its initial definition which is 'haute-couture, ready-to-wear, making-up and retail trade'.
  - ◆ An effort should be made to recruit retailers and designers into Section X.
  - ◆ We should continue to work hard on promotion and improvement of quality, so as to offer the proper products, at the right price to the final consumers with the appropriate information.
- Section X also proposed to

create a special silk event on the occasion of Premiere Vision to promote silk among designers.

## Section XIII

### *Recommendations*

- ◆ It thanks the Chinese delegation for the efforts made during the past two years to mills producing and processing silk fabrics aware of the importance of avoiding folding marks in boiled-off materials. Improvements are noticeable, but not yet in all areas. Efforts to eliminate the man-made causes of these defects have to be continued.
- ◆ In addition, China is requested to optimise the boiling-off processes for fabrics made of mulberry and tussar silk, in order to avoid all chemical and other residues which could later negatively affect dyeing or printing.
- ◆ It is recommended that Chinese be adopted as an official language of the International Silk Association.

## Technology and Research Committee

### *Conclusions*

- ◆ The Committee appreciated the initiative consisting of presenting the results of technological survey concerning research published and available through data-banks and on Internet since the last congress in Brighton. The Committee members suggested that the ISA Monthly Newsletter should open its columns on a regular basis to this type of information rather than present these results every two years on the occasion of the congress.
- ◆ With regard to the specifications and the testing protocol required by ISA of the detergents manufacturers



wishing to use the ISA logo, it was requested that if possible new criteria should be introduced concerning the dimensional stability of the silk products and secondly the appreciation of breaks which may occur on silk washed in the washing-machine.

#### **Silk Standards Committee**

- ♦ The SSC having presented and explained 'Thrown Silk 1997' at the congress in Bangkok proposes that the suggestions made for testing and classify-

ing organzine and tram warp material be referred to Section V 'Silk Throwing' for an assessment and qualified reply by the twisting industry as to how this project should be optimised and completed.

- ♦ The research on the dyeing affinity of raw silk should be continued and coordinated at the level of the silk testing institutes. The Directing Board is to decide whether the project is to be followed up by the Silk Standards Committee or be transferred to the Technology

and Research Committee.

Furthermore, the Directing Board adopted, at its second meeting, the proposed new Trade-Rules for international trade in raw silks and other silk products as drawn up by Mr. Paul Giger (Switzerland) in cooperation with various national delegations. These Trade-Rules do not constitute an obligation but are intended to serve as a basis for transactions between exporters and importers thus providing them with a common language.

(Courtesy : ISA News letter)

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e-mail : [varun@XCVARUN.XEEBLR.XEEMAIL.ems.vsnl.net.in](mailto:varun@XCVARUN.XEEBLR.XEEMAIL.ems.vsnl.net.in)

Fx : 3303271,6610077

### **Readers Write**

The **Letters to the Editor** column is an open forum where anyone who wants to say anything about sericulture and silk industry as well as articles/features published in **Indian Silk** is welcome to do so. Please make your letters brief and to the point. Send your letters to the Editor.

## **Member Secretary's visit**

Shri. Arun Ramanathan, IAS, Member Secretary, Central Silk Board, Bangalore visited the CSB and the State Govt. units in Koraput area of Orissa on July 11 & 12, 1997.

The Member Secretary went around the Mulberry Demonstration Farm at Pottangi, which is supplying improved variety of mulberry cuttings and chawkiworms to the beneficiaries, and expressed happiness over the performance of high yielding silkworm varieties like KPGb x SH6, KA x SH6, etc. He also visited DCTC, Sunabeda and OST&SCS Ltd's reeling centre.



**Member Secretary visits DCTC, Sunabeda**

During his visit to the Regional Sericulturual Research Station (RSRS), Koraput, the Member Secretary made a series of suggestions for improving the working of

the station to suit the requirement of Orissa. He inspected the infrastructure created under the NSP while visiting the SSPC, Koraput and took a stock of the production level of dfls. at the centre and suggested further improvement for appropriate utilization of the infrastructure.

The Member Secretary visited the sericulture village, K. Belagaon in Nandapur block. He met a number of farmers, assessed their performance and heard problems and advised the DOS officials to look into them.

**Report : A.K. Mukherjee, Dy. Secretary, RDO, CSB, Bhubaneswar, Orissa.**

## **U.P. Principal Secretary visits PSDP**



**Shri Khanjan Lal, IAS, Principal Secretary is being explained about mulberry variety**

Shri Khanjan Lal, IAS, Principal Secretary, Govt. of Uttar Pradesh visited the Purvanchal Sericulture Development Project (PSDP), Varanasi on November 26, 1997.

The Principal Secretary went round the Research Extension Centre-cum-Basic Seed Farm and appreciated over the dozen mulberry varieties available in the farm brought from different parts of India. He also expressed happiness

over the experiment of intercropping in mulberry and the low-cost rearing house and mountages developed by CSB with locally materials.

Shri S.B. Saraswat, Dy. Director, PSDP briefed the Secretary about the activities of PSDP. Dr. O.P. Singh, Asst. Director, DOS was also present.

**Report : S.B. Saraswat, Dy. Director, PSDP, CSB, Varanasi, U.P.**

## **Exhibition on Woven Silks**

An exhibition on Woven Silks of 17 and 18th centuries was held at the Prince of Wales Museum in Museum in Mumbai, recently.

"These woven silk draw their inspiration from the style and weaving techniques of the magnificent 'cloths of gold' woven for the courts of Mughal India and safavid Iran in the 17th and 18th centuries", explains textile historian and technologist, Shri Rahul Jain, who brought the event from Delhi to Mumbai.

The exhibition titled 'Minakar' (the Enameller), has been dedicated to the artisans who made the 14 exquisite pieces, capturing in cloth an uncanny resemblance to richly enamelled gold. The exhibition was a tribute to the extraordinary endurance of Indian textile arts and crafts in the context of the 50th year of independence.

*(Source: Express Textile)*



## Kissan Mela in Kashmir Valley



**Hon'ble Minister of State for Industries and Commerce, J&K presents awards to the progressive farmers**

A Kissan Mela of cocoon farmers was organised in Kashmir valley by the Central Sericultural Research & Training Institute, Pampore on 20th October, 1997.

The objective of the Mela was to bring awareness among the rearers about the latest silkworm rearing technology and its adoption for the production of quality cocoons.

The Hon'ble Minister of State for Industries & Commerce, Govt. of J & K, Shri. Aga Sayed Mahmood inaugurated the mela. The Minister lauded the role of CSR&TI, Pampore the maintaining exotic as well as indigenous races of silkworm and mulberry genotypes.

Dr. M.A. Khan, Director I/C, CSR&TI, Pampore briefed the gathering about the research and development activities undertaken by the institute and stressed the need for adopting latest technology by the cocoon growers.

A stall was also put up on improved technologies for the benefit of the farmers.

Later the Minister presented awards in the form of rearing kit and a certificate of merit to six progressive farmers including women rearers for their significant achievement.

**Report : Mir Manzoor Ali, CSR&TI, Pampore**

## Field Day on Ericulture



**Result Demonstration on plantation technique of eri food plant**

With a view to propagate the package of practices for improved host plant cultivation and rearing techniques, a Field Day on Ericulture was organised by the

Central Eri Research and Training Institute (CER&TI), Mendipathar at Jonglapara village, East Garo Hills district, Meghalaya on October 28, 1997.

A total number of 80 farmers besides DOS officials and local leading personalities attended the programme. The farmers were taken to the field of a local progressive farmer, Shri Tilak Ch. Rabha, for demonstration of plantation techniques such as land preparation, pit digging, FYM application, seed sowing, raising of plantation in castor and Kessuru plants. Practical demonstrations were also arranged on different stages of silkworm rearing, hygiene, spacing, leaf preservation, mounting of worms in chandraki and sample harvesting.

Subject experts from CER&TI explained the new technologies evolved by the institute and appealed to the farmers to adopt them for better returns.

**Report : Sr. Research Officer, CER&TI, Mendipathar, East Garo Hills, Meghalaya.**



## Resham Kissan Mela



*Shri Romendra Narayan Kolita, Hon'ble Minister of Sericulture participates as chief guest while Mrs. N.A. Hazarika, Director of Sericulture addresses the inaugural session*

A one-day Resham Kissan Mela for popularising mulberry sericulture amongst the farmers of the North-Eastern States was organised by the Regional Sericultural Research Station (RSRS) Jorhat at the Research Extension Centre (REC), Mangaldoi, Darang, Assam on October 27, 1997.

Shri Romendra Narayan Kolita, Hon'ble Minister of Sericulture, Govt. of Assam, was the chief guest at the function. Nearly 200 farmers from Assam, Meghalaya, Manipur, Mizoram, Nagaland and Tripura besides reelers, weavers and NGOs of Mangaldoi participated in the programme.

An exhibition on new technology was inaugurated by Dr. B. Saratchandra, Director, CSR&TI, Berhampore. The technical session was chaired by Dr. M.V. Samson, Director, SSTL, Bangalore. The Director, CSR&TI, Berhampore was the chief guest. Dr. A.K. Chandra, Deputy Director, RSRS, Jorhat acted as

rapporteur. The subject specialists from RSRS, Jorhat namely Shri. J.D. Phukan, SRO, Shri Debasis Das, Assistant Director and Dr. A.K. Chandra, Deputy Director took part.

Shri R. Chakravorthy, Joint Director, RSRS, Jorhat highlighted the achievements and contributions of the station, towards the development of mulberry sericulture in the region. He requested the farmers to follow the packages of mulberry cultivation and silkworm rearing as recommended and popularised by the station.

The Director, SSTL, Bangalore narrated his experience on mulberry sericulture in Assam. He observed that mulberry sericulture compared to southern states of India is not well organised in Assam. He opined that if the cultural operations like pruning, manuring are attended to, leaf yield of improved mulberry varieties here may easily exceed that of the southern states. He suggested bush

type mulberry cultivation for better result.

Shri C. Das, Assistant Director of Sericulture, Govt. of Assam, Mangaldoi elaborated the scope of sericulture in the rural areas of Assam and other North Eastern States. Sri S.P. Goswami, Manager, NABARD apprised the farmers of various procedures and norms for availing credit facilities.

Shri J.D. Phukan, SRO explained the region specific high yielding mulberry varieties and its package of practice to ensure higher leaf yield. Shri D. Das, SRO discussed about the impact of silkworm egg incubation and rearing practices.

Quite a good number of farmers and participants interacted with the scientist. The Director, CSR&TI, Berhampore and the Director, SSTL, Bangalore participated in the interaction and offered suggestions to the farmers.

The Hon'ble Minister of Sericulture, Govt. of Assam, was chief guest at the open session. Mrs. N.A. Hazarika, Director of Sericulture, Govt. of Assam, presided over. The Director, CSR&TI, Berhampore, and the Director, SSTL, Bangalore, also participated. A number of farmers expressed various difficulties being faced by them before the Hon'ble Minister. One of the difficulties expressed was the cocoon marketing. The Hon'ble Minister and the Director of Sericulture assured them of making some feasible arrangement.

Electronic and Printmedia covered the event

**Report : R. Chakravorthy, Jr.  
Director, RSRS, Jorhat, Assam.**



## Cocoon Growers and Seed Producers Conference

In commemoration of the golden jubilee of India's independence, Silkworm Seed Technology Laboratory (SSTL) of the Central Silk Board in association with Department of Sericulture, Government of Karnataka and Karnataka State Licensed Seed Producers Trust (KSLSPT) organised a one day **Silkworm Seed Cocoon Growers and Seed Producers Conference** at SSTL, Kodathi, Bangalore on November 27, 1997.

The main aim of the conference was to disseminate technologies to the field under lab to land programme and to enlighten the silkworm seed cocoon growers and seed producers about the technologies available and their adoption. Nearly 350 delegates consisting of officers and scientists from Central Silk Board, Karnataka State Sericulture Department, Karnataka State Sericulture Research and Development Institute, seed cocoon growers, seed producers, CRC entrepreneurs and sericulturists participated.

Inaugurating the Conference,



*Shri H. Ekanthiah, Chairman, CSB speaking on the occasion*

Shri R.B. Agwane, IAS, Commissioner for Sericultural Development and Director of Sericulture, Govt. of Karnataka opined that such conferences should be held often and the farmers should make best use of the occasions.

In his presidential address, Shri Arun Ramanathan, IAS., Member Secretary, CSB expressed happiness for having organised the conference involving silkworm seed cocoon growers and seed producers and creating a single forum for interaction with the scientists. He

urged the seed farmers and LSPs to take active participation in the conference, so that scientists can know their problems, absorb ideas and plan their research work accordingly. He was of the opinion that some changes are essential to the policy for the upliftment of sericulture industry.

A technical publication entitled "RESHME ISIRI" was brought out by the Department of Sericulture while SSTL brought out five technical pamphlets on Seed Technology on the occasion.

During the Conference, two technical sessions were held on the following themes:

- Techniques to be adopted to produce quality seed cocoons
- Role of grainages in the production of disease free layings

Seven papers were presented and deliberated at length in these sessions and several recommendations made. Some of the important ones are; specific R & D efforts for a package on practices for mulberry cultivation and management exclusively for seed cocoon production; supply of quality disinfectants, further



*Shri R.B. Agwane, IAS, Director of Sericulture releasing 'Reshme Isiri'*



studies on crop losses due to IFV, Flacherie and melting; remunerative prices for seed cocoons; avoidance of frequent price fluctuations, enhanced bonus for seed cocoons sent for reeling; improvement in quality of bivoltine seed cocoons, avoidance of middle men in seed cocoon transaction; timely supply of F1 dfls etc.

The Plenary Session was graced by Shri Varade Gowda, Hon'ble Minister of Sericulture, Govt. of Karnataka and Shri H. Ekanthaiah, Chairman, Central Silk Board. Summing up the deliberations, the Commissioner, DOS expressed happiness over the awareness amongst the farmers about the technologies and felt that there is a need for developing more bivoltines. He further emphasised the need for participatory research involving the farmers. He also

suggested for providing P2 and P3 seeds to the farmers for multiplication.

Speaking on the occasion, Shri Ramachandra Gowda, President, KSLSPT told that the conference was a memorable one. He thanked the Central Silk Board, Department of Sericulture for organizing this conference on behalf of LSPs Trust. He reiterated that LSPs will never underestimate the farmers and earnestly requested the farmers to harvest good cocoons so as to get good price. He welcomed the idea of forming a forum for regulating quality cocoon production.

Shri Varade Gowda, Hon'ble Minister for Sericulture, DOS, Govt. of Karnataka appreciated the organization of the conference and felt that much research has to be done in the field of reeling. He also suggested for video filming of

the practices followed by the progressive farmers and telecast through Dooradarshan to inspire other sericulturists/farmers.

Shri Ekanthaiah, Chairman, Central Silk Board, in his presidential address opined that this conference is really a purposeful one. He informed that CSB is doing its best to evolve few new races and would be released to the field soon. He further emphasised the need to amend the existing policies by the State Department for the speedy development of the industry. He also informed that a sum of Rs.50 lakh has been allocated to Karnataka under Catalytic Development Assistance Programme and called upon the farmers to make use of the new technologies and scientific guidance for better results.

**Report : T.M. Veeraiah, Joint Director, SSTL, Bangalore.**

## Kissan Diwas



*An adopted farmer sharing his experience after taking up the new technology*

The Research Extension Centre, Central Tasar Research & Training Institute, CSB, Hatgamharia, West Singhbhum district, Bihar organised a Kissan Diwas on September 10, 1997 to propagate new technologies of tasar culture.

**Report : A.K. Sinha, Asst. Director, CTR&TI, REC, Hatgamharia, West Singhbhum, Bihar**

## Dessous China in Shanghai

China's fashion capital, Shanghai, will host 'Dessous China', the international forum for the exhibitors of lingerie, shapewear, homewear, fashion hosiery, swimwear, etc. from 24-26 March, 1998. The fair will be presenting the entire range of body and beachwear besides information on trends and fibres from suppliers to the apparel industry.

The location selected for 1998 for the first will be the Shanghai Mart - China's state-of-the-art exhibition centre. International market leaders numbering 120 from 15 countries will be presenting their products to specialised dealers and a 30% increase in exhibitors clearly reflects their determination to conquer the Asian market.

At the ensuing third event, the



exhibitors of supplies to the apparel industry will have a proper section of their own for the first time. As in the past two years, the admission will be restricted to trade visitors. Organisers expect approximately 7000 visitors from all over the world.

Dessous China is being organised by Igedo company in association with CCPIT Tex and the China Textile International Centre, Beijing.

*More information can be had from:*

Dessous China  
C/o. Igedo Company,  
Stockumer Kirchstrasse,  
61-D-40474, Dusseldorf,  
Phone: ++49-211-4396-384  
Fax: ++49-211-4396-373

## Field Day on Sericulture

A Field Day on popularisation of new technologies, mulberry varieties and silkworm races was organised by the Grainage Extension Centre, Haveri, National Silkworm Seed Project (NSSP), CSB, at Negaloor village in Haveri, Karnataka on November 13, 1997.

The aim of the programme was to enthuse farmers to pursue sericulture by taking cues from those successful farmers who have adopted the new package and practices.

Dr. T. Pavan Kumar, Director, NSSP, Bangalore, stressed the importance of 'qualitative and economic management' in silkworm rearing. The garden main-

tenance and rearing practices of Shri Chapad, a progressive farmer of Negaloor and the innovative silkworm rearing management of Shri Veeranna Kyathappanavar, Doddagabbi village were explained and the farmers were advised to emulate them for success in sericulture.

Shri Jayant Jayaswal, Joint director, Zonal Silkworm Seed Project Office and Shri Dwarkinath, Deputy Director, Silkworm Seed Production Centre, Bangalore explained the importance of quality leaf and disinfectants in rearing.

**(Report : T. Pavan Kumar, Director, NSSP, CSB, Bangalore.)**

## Silk Exhibition at Calcutta

An integrated silk exhibition will be organised by the National Handloom Development Corporation Ltd., at Calcutta from January 29 to February 9, 1998. The exhibition is aimed at promoting awareness of silk from pre-cocoon stage and to display and promote silk export products.

The participating exporters will have the opportunity to dis-

play and sell the products which are hitherto produced and exported only. Items like furnishing fabrics, cushion covers, duvets, etc. can be sold at the exporters stall. Besides, it is likely that exporters may receive trade enquiries leading to more business at local and export areas.

*For more details, contact:*

The National Handloom Development Corporation Ltd.,  
10 & 11th Floors, Vikas Deep,  
22, Station Road,  
Lucknow 226 001  
Fax: 0522-248075

or

The Indian silk export Promotion Council,  
62, Mittal Chambers,  
Nariman Point,  
Mumbai - 400 021.

*(Source: Silknet)*

(Contd. from page 25)

weaving under powerlooms also and is in the quest for technical know-how. He gets designs from the Director of Handlooms, Kancheepuram. Woven Sarees are marketed to private dealers at Kancheepuram.

Babu intends to start a sales depot at Dharmapuri and wants to increase the number of looms by 50-100 in the handlooms. He has plans to supply silk sarees to customers in and around Dharmapuri at a more reasonable price with better designs and good quality

than that of Kancheepuram.

Sales Depots: Three sales depots at Pannagaram, Paparapatti and Dharmapuri are established to sell sericulture accessories like pesticides, formalin, bleaching powder, nylon nets. etc.

Shri Babu suggested that seminars or workshops should be conducted in and around Dharmapuri on the technical know-how of grainage, rearing, reeling, weaving, dyeing and allied subjects. A seasonwise package of technology for races developed to guide farm-

ers for better production and establishment of a silk testing unit at Dharmapuri are the other suggestions

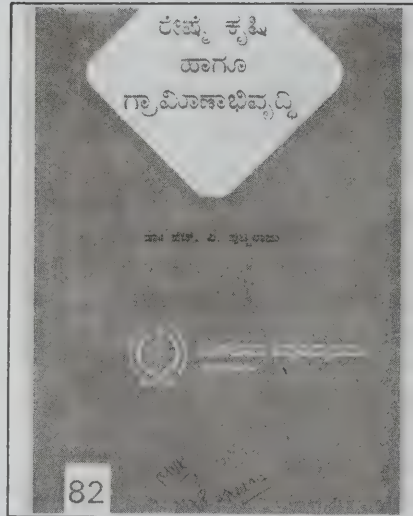
Babu also suggests that Government cocoon storage facility for stifled cocoons may be set up to avoid short supply of cocoons to reelers. This avoids unhealthy competition among cocoon buyers and sellers as the government fixes reasonable rates to buy and sell cocoons.

**The author is with Indian Silk, CSB, Bangalore.**

# 'Reshme Krushi haagu Graminabhivruddhi'

*Stimulating development through sericulture*

India ranks second among the highly populated countries in the world and about 70% of its population is rural based. The main occupation of these people is mainly agriculture or other agro-based activities. Thus, proper utilization of vast land and huge labour force available for the development of the rural sector has been one of the main concerns of our policy makers and administrators. Unless the rural areas develop, one cannot expect the overall development of the country. It is as simple and true as it looks ! That is why it is said that agriculture is the backbone of the country. Though India has witnessed green, blue and white revolutions, the unemployment and poverty still persist, especially in the rural India. On the contrary, the rapid industrialization and urbanization activate many a problem including 'migration' of rural populace especially labourers and farmers to cities in search of better employment opportunities. This 'exodus' triggers in several problems both at the rural as well as urban areas. The need for cottage industries or agro-based industries in the rural areas was thus felt strongly to solve such problems to a greater extent. Though Governments have been implementing a number of programmes/projects, rural development through sericulture is highly suitable because of its unique advantages.



The present booklet- *Reshme Krushi haagu Graminabhivruddhi* - in Kannada (i.e. sericulture and rural development) is the outcome of a 'popular lecture' on the same topic delivered by Dr. H.P Puttaraju at Malur village of Kolar district in Karnataka under the 'popular lecture series' of Bangalore University. Authored also by him, the booklet briefly but precisely discusses the importance of sericulture in the rural development.

Written with infectious enthusiasm, in a simple language the publication introduces sericulture as a rural developmental tool. Interestingly it touches almost all the areas of the industry like mulberry cultivation, silkworm rearing, silk reeling and weaving, silkworm egg production, mulberry's multiple uses. It also discusses suitability of sericulture as - a family avocation, a low investment but high profit earning

industry, a foreign exchange earner and also about bye-products of sericulture. This little 'information guide' even mentions the activities of National Silkworm Seed Project, Grainages, Govt. Sericultural Farms, Chawki Rearing Centres, Technical Service Centres, Cocoon Markets, Silk Exchange, Karnataka Silk Marketing Board, Filature, Training Centres, Sericultural Research Institutes and Centres, credit facilities available, financial assistance from Govt. encouragement given to sericulturists, benefits to women etc. The authors approach is unpretentious and the important subjects are never allowed for long to remain merely a catalogue ! The discussion claims a double position for the social science of rural development through sericulture both as a science, in the making and in society.

With so less books on the subject in Kannada, the new ones must expect a warm welcome. This tiny publication with the authority of the subject behind it, fulfills to some extent the demand of popular writing on the subject. Published by 'Prasaranga' of Bangalore University, the 48 page handy booklet proves to be a good information source for all those concerned with sericulture and rural development.

**Mukund V. Kirsur, Indian Silk,  
CSB, Bangalore**



# Textile Trade Fairs – 1998

<i>Date</i>	<i>Exhibition</i>	<i>Place</i>	<i>Date</i>	<i>Exhibition</i>	<i>Place</i>
	<b>INDIA</b>				
1998 Jan 29-31	<b>INDIA INTERNATIONAL GARMENT FAIR '98</b> Garments Venue : Pragati Maidan Contact : A.E.P.C. Ph : 6169394/9356/57 Fax: 091-011-6168584	New Delhi	11-13	<b>INTERNATIONAL KIDS FASHION</b> Childrenswear Venue : Javit Convention Centre Contact : The Larkin Group New York, NY 10018 Ph : 5940880 Fax : 1-212-5948556	New York U.S.A.
29-01	<b>TEXTYLES INDIA '97</b> Fibres, Yarns, Fabrics, Home Textiles and made-ups, Knits, Trimming and Embellishments, Accessories, CAD/CAM Venue : Pragati Maidan Contact : Trade Development and Merchandising Department Ph : 3371601/3319482 Fax: 091-011-3318142/3320855	New Delhi	14-17	<b>HEIMTEXTIL</b> Home Textiles, Fibres, Yarns Venue : Frankfurt am Main Contact : Indo German Chamber of Commerce, Mumbai Ph : 2186131 Fax: 091-022-2180523	Frankfurt Germany
Feb 18-20	<b>NATIONAL GARMENT FAIR</b> Garments Venue : Bombay Exhibition Centre, NSE - Mumbai Contact : C.M.A.I. Ph : 4928245 Fax: 091-022-4938547	Mumbai	14-17	<b>EUROPE SELECTION</b> Womens, Mens, Kidswear Body to Beach wear Contact : Europe Selection S.r.l., Ph : 852-28029902	Hong Kong
Mar 26-29	<b>GARTEX '98</b> Garment Machinery, Textiles & Accessories Venue : Pragati Maidan Contact : Modern Multi Media Mktg. Co. (India) Pvt. Ltd. Ph : 5704450/4234 Fax: 091-011-5700644/2138	New Delhi	15-18	<b>HONG KONG FASHION WEEK</b> Fabrics, Ready-to-wear, Accessories Venue : Hong Kong Convention and Exhibition Centre Contact : Hong Kong Trade Development Council Ph : 852-25844333 Fax : 852-28240249	Hong Kong
May 29-01	<b>ACC-MA-TEX-II</b> Garment Accessories, Machineries and Textiles (Hosiery and Textile Fabrics) Venue : Netaji Indoor Stadium Contact : Freeman Graphics & Designs Pvt. Ltd. Ph : 6607219/7441 Fax: 091-033-6607441/1803	Calcutta	17-19	<b>PROGETTO INTIMO</b> Underwear and Lingere Contact : Fiera de Milano, 20126 Milano Ph : 66103820 Fax : 939-2-66103844	Milan Italy
	<b>OVERSEAS</b>		23-26	<b>PRET-A-PORTER EFMININ(PAPF)</b> Womens Ready-to-wear, Fashion accessories (Autumn-Winter 1998-99) Venue : Porte de Versailles-Hall 7 Contact : SODES-Service Communication Ph : 44947000 Fax: 33-1-44947034	Paris France
1998 Jan 10-13	<b>INTERNATIONAL FASHION BOUTIQUE</b> Apparel, Accessories and Jewellery Venue : Javit Convention Centre Contact : The Larkin Group New York, NY 10018 Ph : 5940880 Fax : 1-212-5948556	New York U.S.A.	23-26	<b>SEHM</b> Menswear, Leather Garments, Accessories Venue : Porte de Versailles Contact : Promosalons, New Delhi-110011 Ph : 3317054 Fax: 091-011-3722660	Paris France

# Trade Enquiries

Sl. No.	Importers	Interested in
1.	All People Trading Co., P.O. Box 26478-Safat, 13125-Safat, Kuwait Fax : 2459504	Ladies Garments
2.	Al Helal Contracting & Trading Est., P.O. Box 7542, Fahaheel, 64006-Fahaheel, Kuwait Fax : 4899561	Ladies/Gents and Children Garments
3.	GKN Defence P.O. Box 26218-Safat, Kuwait Fax : 5757288	Woven Textiles
4.	M/s Diana Zeidande Hadwesh Manvel Correjo App. 177, Equador, Jordan Tel. : 474673, 474651 Fax : 474672	Textile Products
5.	Mr. Gul Dayaram Diagonal Cervantes 683, Ofc. 506, Santiago, Chile Tel : (56-2) 6382944 Fax : (56-2) 6325459	Textiles, Curtains, Upholstery
6.	Bedi Investments P.O. Box 230, Nakuru, Nairobi Tel : (037) 212320/1 Fax : (037) 44776	Garment Accessories
7.	Moammed AH Medals Mohd. Al Modaihesh, P.O. Box 31553, Riyadh Tel : 4594163 Fax : 4594163	Apparels Textiles
8.	Mohammed Al Baiz A.M. Al Baz Co., P.O. Box 444, Shaqra, Riyadh Tel : 01-6220503 Fax : 01-6220503	Handloom Textiles
9.	Mishnan F Dosary Mishnan Corpn., P.O. Box 6295, Dammam, Riyadh Tel : 8267115 Fax : 8262969	Textiles
10.	Saad O Al Ghamdi Sallyat Trading Est., P.O. Box 4838, Jubail Indust. City, Riyadh Tel : 03-3461375 Fax : 03-5322849	Textiles



# शहतूत में जड़-गांठ रोग के नियंत्रण की जैव विधि

दिनेश दत्त शर्मा

**मै** लोईडोगाइन इनकोगनिटा सूत्रकृमि द्वारा होनेवाले जड़-गांठ रोग का प्रकोप बहुधा शहतूत की सिंचित वाटिकाओं तथा दोमट मिट्टी में, उष्णकटिबंधीय तथा उपोष्णकटिबंधीय क्षेत्रों में प्रत्येक मौसम में होता है। इस खतरनाक रोग की जानकारी पौधा उखाड़ने पर ही लगाई जा सकती है। सर्वेक्षण से ज्ञात हुआ है कि लगभग 60-70% शहतूत वाटिकाएँ इस रोग से प्रभावित हैं जिससे पत्तियों की पैदावार में लगभग 12% से अधिक कमी आती है। मै. इनकोगनिटा की चार प्रजातियाँ पायी जाती हैं जिनमें



शहतूत पौधे में जड़-गांठ रोग

रेशमकीटों के खाद्य पौधों का स्वास्थ्य कोसों की बेहतर प्राप्ति का एक महत्वपूर्ण नियामक है। शहतूत पौधों में जड़-गांठ रोग से जड़ों की संधारण क्षमता का क्षय तथा परिणामतः पौधों का क्रियात्मक विकास अवरुद्ध होता है। प्रस्तुत जैव प्रौद्योगिकी द्वारा रोग के प्रभावी नियंत्रण से रेशम कृषक के आय में पर्याप्त वृद्धि तो सुनिश्चित है ही, प्रयोग से संभावित दुष्प्रभाव भी न्यूनतम हैं।

प्रजाति-2 शहतूत के पौधों में सूत्रकृमि रोग उत्पन्न करती है। 15-30° सेग्रे तापमान, 40-60% मृदा आर्द्रता एवं 4-8 पी एच सूत्रकृमि के विकास के लिए सर्वाधिक उपयुक्त है।

चूँकि अनुशंसित फ्यूरेडान व रगबी 10 जी सदृश पीड़कनाशी के प्रयोग से शहतूत पत्तियों में 40 दिनों से अधिक अविषानुता होने के साथ-साथ उनका भूमि में प्रयोग करने से मृदा में उपस्थित लाभदायक जीवाणुओं एवं अन्य सूक्ष्मजीवों पर विपरीत

प्रभाव पड़ता है। इसके अतिरिक्त इनके प्रयोग से प्रदूषण गन्दा हो जाता है। अतएव, उपरोक्त तथ्यों का ध्यान में रखते हुए इस रोग के नियंत्रण हेतु प्रदूषणमुक्त नई प्रौद्योगिकी का विकास किया गया है।

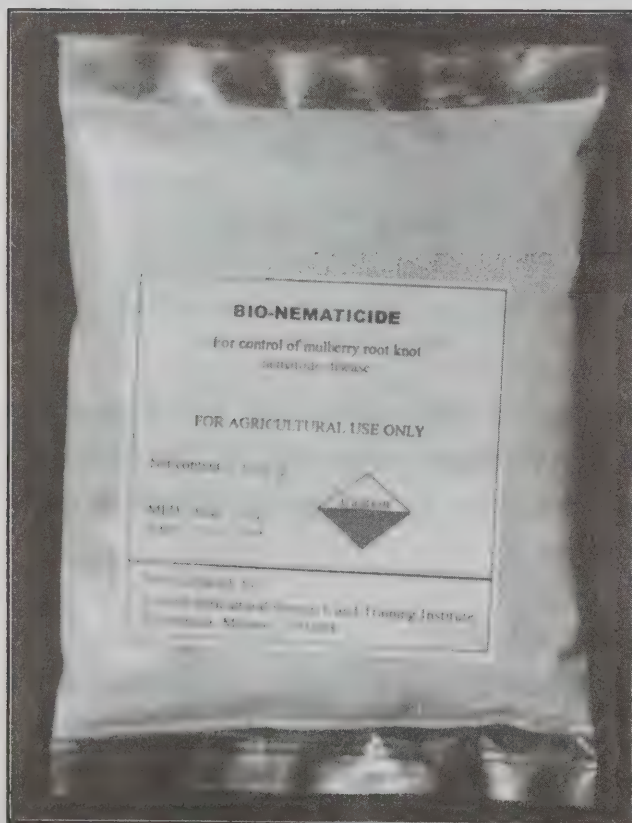
## लक्षण एवं प्रभाव

□ सूत्रकृमि के कृप्रभाव से जड़ों पर विशिष्ट प्रकार की गांठें बननी शुरू हो जाती हैं, अतिवृद्धि एवं अतिवर्धन विधियों से जड़-गांठों की संख्या तथा उनके विकास में वृद्धि होती रहती है। रोग के गंभीर होने की अवस्था में ये गांठें पूरी जड़ों पर फैल जाती हैं जिससे जड़ों में संधारण क्षमता

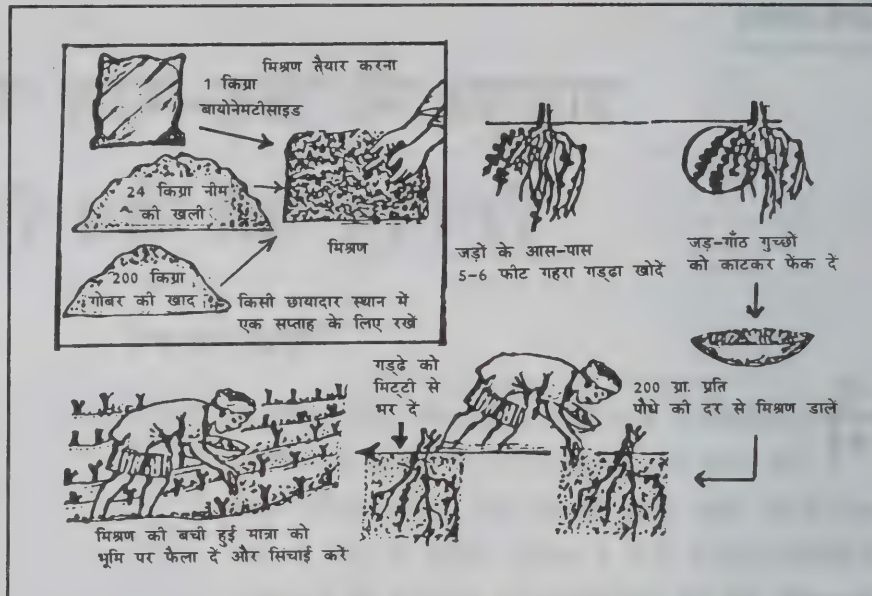
में कमी आने से पत्तों के किनारे निर्जीव तथा पीले पड़ जाते हैं और पौधों की वृद्धि रुक जाती है और वे बौने रह जाते हैं।

- इस भूमिगत रोग के प्राथमिक स्रोत में रोगग्रस्त पौधा, कृषि उपकरण एवं शहतूत के साथ अन्य रोग-संवेदनशील फसलों की खेती करना तथा कुछ खरपतवार सम्मिलित हैं।
- जड़ों के पोषवाह (फ्लोएम) तथा दारू (जाइलम) ऊतक पूरी तरह अस्त-व्यस्त हो जाते हैं जिससे सूत्रकृमि से प्रभावित जड़ें पानी तथा खनिज पदार्थों का मिट्टी में संधारण कर पौधों के ऊपरी भाग तक पहुँचाने में असमर्थ हो जाती हैं और पौधों का क्रियात्मक विकास बाधित हो जाता है।

इस नई प्रौद्योगिकी में वरटीसिलियम क्लेमाइडोस्पोरियम फफूंद को टाल्क पाऊडर में मिलाकर बायोनेमटीसाइड बनाया



रोग नियंत्रण में प्रभावी - बायोनेमटीसाइड



बायोनेमटीसाइड प्रयोग करने की विधि

जाता है तथा नीम की खली के साथ इसके मिश्रण के प्रयोग से रोग को नियंत्रित किया जा सकता है।

### प्रयोग की विधि

- एक किग्रा बायोनेमटीसाइड को 200 किग्रा बारीक गोबर की खाद तथा 24 किग्रा नीम की खली में अच्छी तरह से मिलाकर मिश्रण तैयार करें (यह 1,000 पौधों के लिए पर्याप्त है)। एक सप्ताह के लिए किसी छायादार स्थान पर इस मिश्रण में थोड़ा पानी डालकर नम (करीब 30-40% नमी) कर दें। इससे जैविक सूक्ष्म जीवों की संख्या में वृद्धि होती है।
- जड़ों के आस-पास की मिट्टी को 5-6 फीट गहरा खोदकर तथा अंगूर के समान के जड़-गांठ गुच्छों को काटकर किसी अन्य स्थान पर जला देना चाहिए।
- मिश्रण को 200 किग्रा प्रति पौधे की दर से जड़ों के चारों तरफ डाल दें तथा गड्ढे को मिट्टी से भर दें। बचे हुए मिश्रण को पौधे के आसपास की मिट्टी में मिला (चित्रानुसार) दें।
- प्रतिवर्ष तीन खुराक चार महीनों के अन्तराल पर कृषि-क्रियाओं के दौरान या रासायनिक उर्वरक के साथ दे सकते हैं। मिश्रण डालने के तुरंत पश्चात् सिंचाई करना अति आवश्यक है।
- प्रकोप गंभीर होने पर यह उपचार लगातार 2-3 वर्षों तक करना चाहिए।



## आर्थिक लाभ

- यह प्रौद्योगिकी अधिक प्रभावी एवं पारिस्थितिकी-अनुकूल तथा प्रदूषण रहित है। इस विधि को अपनाने से लगभग 85-90% तक रोग की विभीषिका में कमी आ जाती है तथा पत्तियों की पैदावार में लगभग 23% की वृद्धि होती है। जबकि पूर्वअनुशासित विधियों जैसे, 2 टन/हेक्टेर/वर्ष नीम की खली अथवा 40 किग्रा/हे/वर्ष फ्यूरेडान का प्रयोग करने से केवल 63-73% रोग के प्रकोप में कमी आती है तथा 16-18% पत्तियों की पैदावार में वृद्धि होती है।
- इस विधि से रु. 7,300/हे/वर्ष का लाभ प्राप्त होता है जबकि अनुशासित अन्य विधियों से केवल रु. 6,200-6,900/- तक लाभ प्राप्त होता है।
- व. क्लेमाइडोस्पोरियम शहदूत के लिए विषैला नहीं है तथा नीम की खली एवं रासायनिक उर्वरक के साथ उपयुक्ततः प्रयोग किया जा सकता है।
- इस विधि के प्रयोग से रेशमकीट के विकास-दर पर प्रतिकूल प्रभाव नहीं पड़ता एवं पत्तियों का उपयोग कभी भी किया जा सकता है।
- नए पौधारोपण के लिए उपरोक्त मिश्रण को 500 प्रति

वर्गमीटर की दर से बागान में भूमि पर फैला कर गुड़ाई या जुताई द्वारा मिट्टी में मिलाकर प्रयोग करना चाहिए।

## सावधानियाँ

- बायोनेमटीसाइड का प्रयोग पैकेट पर अंकित अंतिम तिथि के पूर्व ही करना चाहिए।
- बायोनेमटीसाइड के प्रयोग के दौरान मिट्टी में किसी भी कीटनाशी दवा का प्रयोग न करें।
- जड़-गांठ रोग से ग्रस्त पौधों को नए पौधारोपण के लिए प्रयोग में न लाएँ।

## अनुशंसा

- प्रति हेक्टेर बागान के लिए 80 किग्रा बायोनेमटीसाइड 2 मी. टन नीम की खली तथा 20 मी. टन गोबर की खाद का प्रबन्ध रखें।
- प्रतिवर्ष 20 मी. टन/हेक्टेर गोबर की खाद का प्रयोग मिश्रण बना कर ही करें।

लेखक केन्द्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान, मैसूर में कार्यरत हैं।

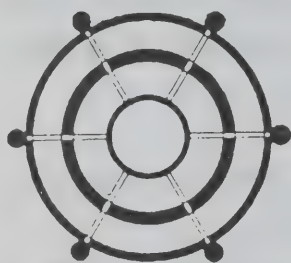
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Ph : 6687808, 6689152 Fax : 6680435**



# Exports Review

Foreign exchange earnings of the Indian silk industry during the month of October '97 amounted to Rs. 8218.75 lakh compared to Rs. 8708.77 lakh during October '96.

During the first seven months

## Review of Silkgoods Certified for Exports

During October 1997 and April to October '97 period of the year 1997-98

TABLE - I

### Export Performance of Indian Silk Industry

(Unit : Lakh ; Qty : Silkgoods ; Sq. Mtrs. ; Silkyarn/Silkwaste : Kg ; Value : Rs.)

Item of Export	October				% Increase		April to October				% Increase	
	1997		1996				1997-98		1996-97			
	Qty.	Value	Qty.	Value	Qty.	Value	Qty	Value	Qty.	Value	Qty.	Value
A. Silkgoods :												
(1) Mulberry												
(i) Dress Material	16.82	2819.21	17.91	2896.75	-6.1	-2.7	110.61	19092.31	117.60	19054.48	-5.9	0.2
(ii) Readymade Garments	8.14	2072.62	11.62	2487.11	-29.9	-16.7	34.93	10355.07	63.25	13279.58	-44.8	-22.0
(iii) Carpets	0.18	1421.95	0.11	1063.99	63.6	33.6	0.67	5755.57	0.56	4443.79	19.6	29.5
(iv) Sarees	1.87	420.03	2.76	575.37	-32.2	-27.0	19.44	4100.20	21.92	4095.82	-11.3	0.1
(v) Scarves/stoles	3.74	410.16	8.46	778.12	-55.8	-47.3	32.42	3413.23	45.94	4378.62	-29.4	-22.0
(vi) Others	2.46	487.83	2.78	534.60	-11.5	-8.7	17.10	3388.47	19.54	3277.69	-12.5	3.4
Mulberry Total [i to vi]	33.21	7631.80	43.64	8335.94	-23.9	-8.4	215.17	46104.85	268.81	48529.98	-20.0	-5.0
(2) Tasar	0.87	121.40	0.61	132.67	42.6	-8.5	4.58	726.96	5.52	1035.79	-17.0	-29.8
Total [1+2]@	34.08	7753.20	44.25	8468.61	-23.0	-8.4	219.75	46831.81	274.33	49565.77	-19.9	-5.5
(3) Mixed/Blended	2.17	319.17	1.89	240.16	14.8	32.9	14.82	2104.47	12.85	1304.75	15.3	61.3
Total [1+2+3]	36.25	8072.37	46.14	8708.77	-21.4	-7.3	234.57	48936.28	287.18	50870.52	-18.3	-3.8
B. SILKYARN	0.07	19.41	-	-			0.13	61.33	0.04	43.42	225.0	41.2
C. SILKWASTE	0.67	126.97	-	-			3.63	642.44	0.08	11.40		
TOTAL [A+B+C]		8218.75		8708.77		-5.6		49640.05		50925.34		-2.5

@ Refers to total natural silk goods exports

viz., April to October '97 period of the year 1997-98, foreign exchange earnings from silkgoods certified for exports amounted to Rs. 49640.05 lakh as against Rs. 50925.34 lakh during the corresponding period of previous year.

Data on itemwise silkgoods certified for exports by Central Silk Board are given in Table - I.

Comparative data on region-wise silkgoods certified for exports are given in Table-II.

### Natural silkgoods

During October '97, the natural silkgoods certified for exports amounted to 34.08 lakh sq. mtrs. valued at Rs. 7753.20 lakh as against 44.25 lakh sq. mtrs. valued

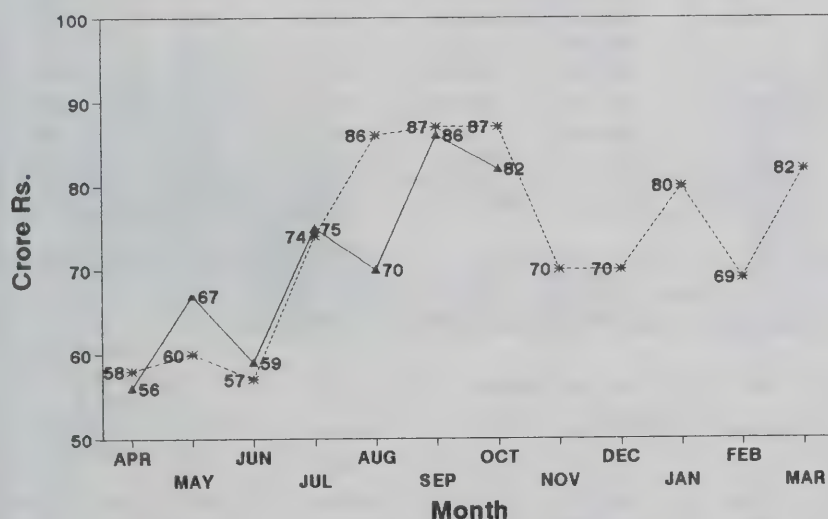


**Table - II**  
**Regionwise Silkgoods certified for exports**

[Unit: Lakh; Qty: Sq. mtrs; Value: Rs.]

Region	October						April to October					
	1997		1996		% Increase		1997-98		1996-97		% Increase	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
West Europe	12.19	2879.05	16.10	3059.24	-24.3	-5.9	91.79	19080.83	109.43	19645.55	-16.1	-2.9
U.S.A. & Others	16.16	3558.16	18.74	3693.68	-13.8	-3.7	84.51	19454.32	112.09	21249.54	-24.6	-8.4
Asia	6.20	1217.12	6.78	1209.91	-8.6	0.6	46.63	7625.70	47.12	6753.67	-1.0	12.9
Japan & Others	0.67	169.56	0.76	211.03	-11.8	-19.7	4.65	1212.03	6.32	1463.59	-26.4	-17.2
Africa	0.79	215.35	0.88	248.90	-10.2	-13.5	4.70	1297.15	4.18	882.92	12.4	46.9
East Europe	0.24	33.13	2.88	286.01	-91.7	-88.4	2.29	266.25	8.04	875.25	-71.5	-69.6
Total	36.25	8072.37	46.14	8708.77	-21.4	-7.3	234.57	48936.28	287.18	50870.52	-18.3	-3.8

### *Silk Export Earnings*



at Rs. 8468.61 lakh during the corresponding month of previous year.

During April to October '97 period of the year 1997-98, the aggregate natural silkgoods certified for exports amounted to 219.75 lakh sq. mtrs. valued at Rs. 46831.81 lakh as against 274.33 lakh sq. mtrs. valued at Rs. 49565.77 lakh during the corresponding period of preceding year and showed a decrease of 19.9% in quantity and 5.5% in value.

### **Mulberry silkgoods**

During October '97, mulberry silkgoods certified for exports amounted to 33.21 lakh sq.mtrs. valued at Rs. 7631.80 lakh as against 43.64 lakh sq. mtrs. valued at Rs. 8335.94 lakh during October '96.

During April to October '97 period of the year 1997-98, mulberry silkgoods certified for exports amounted to 215.17 lakh sq. mtrs. valued at Rs. 46104.85 lakh compared with 268.81 lakh sq. mtrs. valued at Rs. 48529.98

lakh during the corresponding period of 1996-97. It showed a decrease of 20% in quantity and 5% in value. Out of the total natural silkgoods certified for exports, the share of mulberry silkgoods roughly amounted to 98% both in quantity and value, respectively.

Countrywise data of mulberry silkgoods certified for exports is given in Table - III.

### **Varietywise mulberry silkgoods**

During April to October '97 period of the year 1997-98, among the various varieties of mulberry silkgoods certified for exports, dress materials ranked first followed by readymade garments, carpets, sarees and scarves/stoles. Data of varietywise mulberry silkgoods certified for exports are given in Table - I.

### **Tasar silkgoods**

During October '97, tasar silkgoods certified for exports amounted to 0.87 lakh sq.mtrs. valued at Rs. 121.40 lakh compared with 0.61 lakh sq.mtrs. valued at Rs. 132.67 lakh during October '96.

During April to October '97 period of the year 1997-98, a total

**Table - III**  
**Foreign Exchange Earnings from Mulberry Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	October		%	April to October		%	Country Share Percentage in	
	1997	1996		1997-98	1996-97		1997-98	1996-97
U.S.A.	3167.07	3269.99	-3.1	16814.50	18439.84	-8.8	36.5	38.0
Germany	1141.64	1251.34	-8.8	6678.93	6782.01	-1.5	14.5	14.0
U.K.	614.59	638.48	-3.7	4370.25	4918.61	-11.1	9.5	10.1
France	223.08	218.36	2.2	1782.05	1562.44	14.1	3.9	3.2
Canada	213.76	244.06	-12.4	1526.86	1628.08	-6.2	3.3	3.4
U.A.E.	147.32	169.48	-13.1	1457.49	1317.19	10.7	3.2	2.7
Italy	294.28	228.37	28.9	1406.90	1116.18	26.0	3.1	2.3
Singapore	145.41	241.93	-39.9	1398.80	1426.93	-2.0	3.0	2.9
Hong Kong	225.60	247.86	-9.0	1205.15	1106.73	8.9	2.6	2.3
Netherlands	103.25	136.13	-24.2	853.36	1037.41	-17.7	1.9	2.1
Denmark	86.54	56.51	53.1	638.28	441.77	44.5	1.4	0.9
Australia	90.16	84.43	6.8	625.40	818.95	-23.6	1.4	1.7
Thailand	194.55	100.25	94.1	517.00	213.73	141.9	1.1	0.4
Mauritius	67.88	74.88	-9.3	493.63	281.71	75.2	1.1	0.6
Switzerland	55.16	90.61	-39.1	486.62	584.13	-16.7	1.1	1.2
Malaysia	26.87	46.85	-42.6	424.79	361.14	17.6	0.9	0.7
Spain	55.46	77.28	-28.2	413.67	512.92	-19.3	0.9	1.1
Japan	43.47	83.16	-47.7	347.06	404.65	-14.2	0.8	0.8
Belgium	34.47	71.87	-52.0	313.21	424.57	-26.2	0.7	0.9
Austria	27.34	64.58	-57.7	309.08	426.81	-27.6	0.7	0.9
Others	673.90	939.52	-28.3	4041.82	4724.18	-14.4	8.8	9.7
Total	7631.80	8335.94	-8.4	46104.85	48529.98	-5.0	100.0	100.0

@ Refers to top 20 importing countries

**Table - IV**  
**Foreign Exchange Earnings from Tasar Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	October		%	April to October		%	Country Share Percentage in	
	1997	1996		1997-98	1996-97		1997-98	1996-97
Germany	24.31	27.07	-10.2	114.51	190.89	-40.0	15.8	18.4
U.S.A.	17.89	22.87	-21.8	108.73	210.25	-48.3	15.0	20.3
U.A.E.	1.60	9.70	-83.5	71.36	105.98	-32.7	9.8	10.2
Hong Kong	20.33	-	-	70.60	11.27	526.4	9.7	1.1
France	12.06	5.34	125.8	56.19	37.25	50.8	7.7	3.6
Japan	4.03	26.25	-84.6	52.75	89.18	-40.8	7.3	8.6
Italy	11.47	11.01	4.2	39.21	37.51	4.5	5.4	3.6
Brazil	0.53	3.83	-86.2	25.70	19.16	34.1	3.5	1.8
Spain	9.72	0.12	8000.0	24.11	12.22	97.3	3.3	1.2
Turkey	-	1.04	-100.0	15.76	9.52	65.5	2.2	0.9
U.K.	1.09	3.79	-71.2	15.04	67.87	-77.8	2.1	6.6
South Africa	1.73	1.94	-10.8	12.95	10.97	18.0	1.8	1.1
Kuwait	8.22	8.84	-7.0	12.44	23.60	-47.3	1.7	2.3
Belgium	-	-	-	11.74	2.81	317.8	1.6	0.3
Saudi Arabia	-	-	-	11.46	4.19	173.5	1.6	0.4
Colombia	-	-	-	9.60	-	-	1.3	0.0
Canada	-	0.24	-100.0	7.43	25.91	-71.3	1.0	2.5
Chile	-	-	-	6.85	4.29	59.7	0.9	0.4
Yugoslavia	0.29	0.57	-49.1	6.51	9.70	-32.9	0.9	0.9
Afghanistan	-	-	-	5.92	2.10	181.9	0.8	0.2
Others	8.13	10.06	-19.2	48.10	161.12	-70.1	6.6	15.6
Total	121.40	132.67	-8.5	726.96	1035.79	-29.8	100.0	100.0

@ Refers to top 20 importing countries

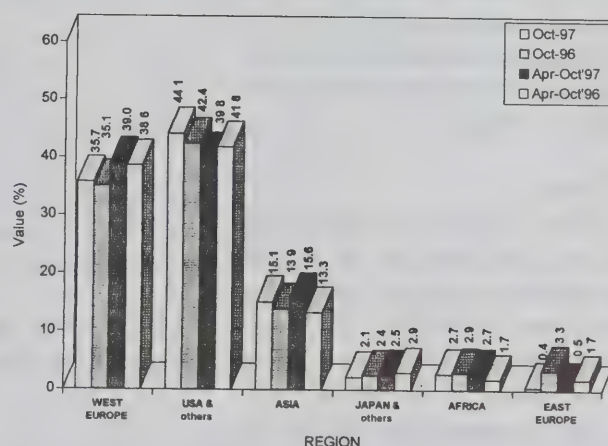
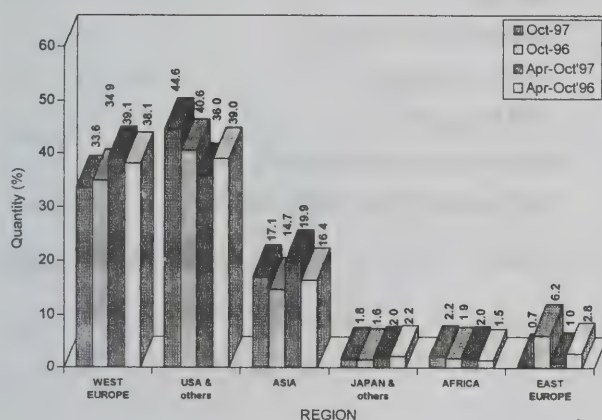


**Table - V**  
**Unit Export Price**

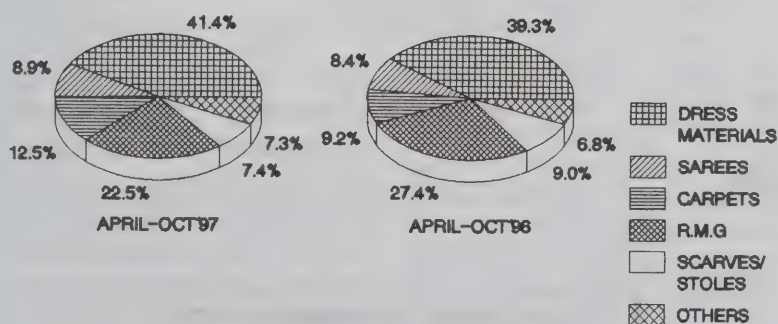
(Rs. per Sq.mtr.)

Item	October			April-October		
	1997	1996	% Increase	1997-98	1996-97	% Increase
<b>A. Mulberry Silkgoods</b>						
1. Excl. Carpets	188.03	167.05	12.6	188.11	164.35	14.5
2. Incl. Carpets	229.80	191.00	20.3	214.27	180.54	18.7
3. Carpets	7677.50	9453.49	-18.8	8544.24	7930.38	7.7
<b>B. Tasar Silkgoods</b>	139.84	218.23	-35.9	158.85	187.45	-15.3

### REGION-WISE SILKGOODS CERTIFIED FOR EXPORTS



### Share percentage of Varietywise Mulberry Silkgoods Export Earnings



quantity of 4.58 lakh sq. mtrs. of tasar silkgoods valued at Rs. 726.96 lakh was certified for exports as against 5.52 lakh sq. mtrs. valued at Rs. 1035.79 lakh during the corresponding period of previous year.

Countrywise data of tasar silkgoods certified for exports are given in Table-IV.

### Unit export price

The unit export price realised for mulberry and tasar silkgoods during October '97 and April to October '97 period of the year 1997-98 along with comparative data of previous year are given in Table-V.

### Mixed or blended silkgoods

During October '97, mixed/blended silkgoods certified for exports amounted to 2.17 lakh sq.mtrs. valued at Rs. 319.17 lakh compared with 1.89 lakh sq. mtrs. valued at Rs. 240.16 lakh during October '96 and showed a perceptive increase both in quantity and value.

Mixed/blended silkgoods certified for exports during April to October '97 period of the year 1997-98 amounted to 14.82 lakh sq. mtrs. valued at Rs. 2104.47 lakh compared with 12.85 lakh sq. mtrs. valued at Rs. 1304.75 lakh in the corresponding period of previous year and reflected an increase of 15.3% in quantity and 61.3% in value.

### Silkyarn

About 13 tons of spun and noil silk yarn valued at Rs. 61.33 lakh has been certified for exports during April to October '97 period of the year 1997-98 as against 4 tons valued at Rs. 43.42 lakh in the corresponding period of 1996-97.

### Silkwaste

Silkwaste and its bye-products certified for exports during April to October '97 period of the year 1997-98 amounted to 363 tons valued at Rs. 642.44 lakh as against 8 tons valued at Rs. 11.40 lakh in the corresponding period of previous year.

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# Silk Prices

October 1997

## Raw Silk : Volume of Transaction

At all the silk exchanges in Karnataka, a total quantity of 134.964 tons of all qualities of raw silk valued at Rs.1463.085 lakh was transacted during the month of October '97 as against a quantity of 147.390 tons valued

transaction at Bangalore Silk Exchange alone accounted for 76.8% and 72.7% in both quantity and value, respectively.

During the first seven months of the year 1997-98 (i.e., April to October '97) at Bangalore Silk Exchange, a total quantity of 804.199 tons of all qualities of raw silk valued at Rs. 7852.454 lakh was transacted.

The volume of trade at Bangalore Silk Exchange during the period April to October '97 accounted for 80.8% in quantity and 77.3% in value of the total transaction in all silk exchanges of the State.

Data on qualitywise transaction of raw silk at Bangalore Silk Exchange *vis-a-vis* all silk exchanges in Karnataka during

**Table I. Transaction of Raw Silk at Bangalore Silk Exchange**

Raw Silk Quality	(Qty. : Tons, Value : Lakh Rs.)							
	October '97		October '96		April '97-October '97		April '96-October '96	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Filature/ Cottage Basin	19.328 (41.136)	256.703 (546.751)	19.306 (32.825)	261.164 (443.841)	146.077 (266.081)	1875.878 (3425.356)	150.765 (276.877)	1938.597 (3616.238)
Charka	65.157 (73.823)	712.037 (814.478)	78.127 (87.392)	850.676 (960.485)	485.956 (550.600)	5011.245 (5723.011)	456.032 (541.44)	4970.685 (5929.332)
Dupion	19.108 (20.005)	95.369 (101.856)	26.965 (27.173)	146.405 (147.610)	172.166 (178.623)	965.331 (1013.252)	157.520 (158.317)	932.995 (937.879)
Total	103.593 (134.964)	1064.109 (1463.085)	124.398 (147.390)	1258.245 (1551.936)	804.199 (995.304)	7852.454 (10161.619)	764.317 (966.634)	7842.277 (10483.449)

+ Figures in bracket refer to total transaction at all the Silk Exchanges in Karnataka

at Rs. 1551.936 lakh during October '96. During the first seven months of the year of 1997-98 (i.e., April to October '97), at all silk exchanges in Karnataka, a total quantity of 995.304 tons valued at Rs. 10161.619 lakh was transacted as against 976.634 tons valued at Rs. 10483.449 lakh of the preceding year.

## Bangalore Silk Exchange

At Bangalore Silk Exchange, which is the largest exchange in Karnataka, a total quantity of 103.593 tons of all qualities of raw silk viz., filature/cottage basin, charka and dupion, valued at Rs. 1064.109 lakh was transacted during October '97 as compared to 124.398 tons valued at Rs. 1258.245 lakh during October '96. Of the total transaction in the State, the volume of

**Table II. Transaction of raw silk of different qualities at Bangalore Silk Exchange during October '97**

Denier	Quality	Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
				Min.	Max.	W. Avg.
Filature Raw Silk						
13/15	Fine	354	491742	1350	1425	1389
14/16	Fine	867	1209392	1330	1470	1395
16/18	Fine	4104	5488819	1060	1480	1337
18/20	Medium	6129	8169601	1050	1510	1333
20/22	Medium	5091	6647026	980	1540	1306
22/24	Medium	241	305053	750	1328	1266
24/26	Medium	388	500382	1200	1350	1290
26/28	Coarse	1306	1746714	1120	1575	1337
28/30	Coarse	250	317834	381	1430	1271
30/32	Coarse	598	793737	1000	1540	1327
	Total	19328	25670300	400	1575	1328
Charka Raw Silk						
	Coarse	907	737444	605	968	813
	Medium	12730	11992708	700	1080	942
	Fine	51520	58473548	720	1390	1135
	Total	65157	71203700	630	1395	1093



**Table III. Prices of Indigenous Silk**

(Rs./Kg)							
Silk Exchange	Variety	October '97			October '96		
		Min	Max	Avg	Min	Max	Avg
Bangalore Silk Exchange (Karnataka)	Filature/Cottage Basin	381	1575	1328	950	1575	1353
	Charka	605	1390	1093	500	1430	1089
	Dupion	200	810	499	200	875	543
Anna Silk Exchange, Kanchipuram Market (Tamil Nadu)	Filature/Cottage Basin	1110	1270	1229	1190	1400	1280
	Charka	850	965	926	840	1060	959

**Imported Silk (Varanasi Market)**

(Rs./Kg)				
Filature Silk 20/22 dr.	October '97		October '96	
	Min	Max	Min	Max
Chinese	1580	1700	1310	1400
Korean	1475	1600	1300	1350

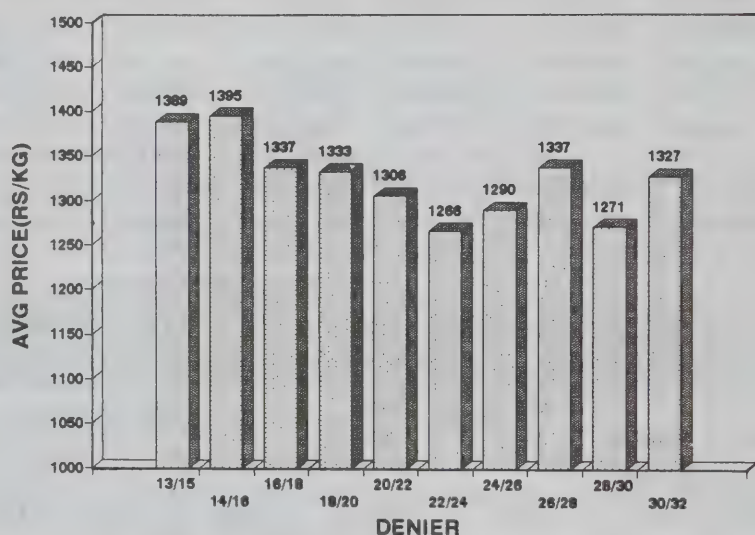
October '97, October '96, April '97 to October '97 and April '96 to October '96 are given in Table-I. The transaction of raw silk of different deniers of filature/cottage basin raw silk and qualitywise charka raw silk at Bangalore Silk Exchange during October '97 is given in Table-II.

#### Prices of sericultural commodities

The prices of different qualities of indigenous raw silk ruled at Bangalore Silk Exchange (Karnataka) and Anna Silk Exchange (Tamil Nadu) in addition to prices of imported raw silk at Varanasi market during October '97 in comparison with October '96 are given in Table - III.

The prices of different varieties of mulberry reeling cocoons quoted at important cocoon markets of southern states viz., Karnataka, Tamil Nadu and Andhra Pradesh are given in Table IV.

**Average Prices of Denierwise Filature Raw Silk Transacted at Bangalore Silk Exchange**



**Table IV. Mulberry Reeling Cocoon Prices**

(Rs/kg.)						
State	Market	Variety	October '97		October '96	
			Min	Max	Min	Max
Karnataka	Ramanagaram	Imp. cross breed	65	161	58	162
		Ord. cross breed	32	90	28	89
Tamil Nadu	Vaniyambadi	Imp. cross breed	50	110	60	115
		Coimbatore	70	142	57	108
Andhra Pradesh	Hyderabad	Multivoltine	40	126	30	127
		Dharmavaram	51	140	20	132

*Compiled by Statistical Section, CSB*





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**COVER :** A colourful depiction of Dharmavaram Silk sarees - Blend of tradition and modernity. Photo Courtesy : Shantala Silk House and Nalli Silks Arcade, Bangalore

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# Dharmavaram Silks : Developmental Needs

**T**he moment one thinks of Indian silks, it is the traditional saree culture that strikes the mind immediately. It has kept the wheels rolling since ages. It is the very culture that has inspired millions of craftsmen across the country to weave their imaginations into enthralling designs. It is nothing short of a wonder, to see a weaver in a far off village, with no or little education, glued on to a wooden loom with all dedication, busy shuttling between warp and weft to weave a colourful saree, full of mindboggling intricate weaves and designs. Hardly, he knows the wearer who wraps around herself with his creation with all admiration for his skills. The story is true of our silk weaving enclaves; the place, persons and designs may change.

Dear readers, we bring you in this issue, a travelogue on Dharmavaram, a well-known silk weaving centre of Andhra Pradesh. Hope, it makes an interesting reading. Dharmavaram, as one could make out from the pages that follow, is a success story of a traditional cotton-turned-silk weaving centre in the recent past, especially the post-independent era.

Yet, there are some areas of concern. Most of the weavers in Dharmavaram are practising weaving by tradition. The looms and accessories at large lack maintenance contributing to many a weaving defect. There is a need to motivate the weavers to opt for improved and standardised equipments/accessories. Such upgradation will not only help improve the quality of weaving but also enhance the productivity. It may also reduce

the fatigue of the weaver. Besides, systematic training in improved techniques of weaving, dyeing and related areas will enable them to respond better to the market needs.

The dyeing sector though is doing well, one can feel the need for improvement. Much of the techniques in practice here, need upgradation and standardization. In the backdrop of the ban on use of azo dyes and the increasing need to use more eco-friendly dyes, attempts to educate the local dyers and weavers about the quality dye stuffs, motivating them to adopt standard package of practices for degumming and dyeing are necessary.

Today, no doubt, products of Dharmavaram have a good market and newer designs are rolling out frequently. But, at the same time, one should not tend to forget the traditional designs that rendered an exclusivity to the products of the centre. It is said that at times these products are sold in the name of Kanjeevaram sarees because of close similarities in their appearance and designs. Though this would help fetch an instant premium, it would affect the identity of the Dharmavaram silks in the long run.

It is essential that the exclusivity of designs and traditions are maintained and nurtured well, with judicious blending of tradition and modernity, of course. All this calls for an integrated approach and comprehensive plan from all the concerned to develop the centre in its entirety.

 Editor

### For a social cause

This has reference to the article "Arjun Plantation under Social Forestry" by S.K. Tewari (*Indian Silk*, October, 1997). The article rightly emphasises the need for Arjun plantation under social-forestry programme by different departments. Under their projects, Forest Department can establish Arjun plantation in all tropical states, particularly in Bihar, Madhya Pradesh, Orissa, West Bengal, Andhra Pradesh and Uttar Pradesh. Arjun plants are not only a source of income through tasar rearing but also have medicinal value. Further, these biological flora would generate fresh air to control the present pollution.

More than a decade back, Arjun plantations were established under economic plantation under the Inter State Tasar Project on recommendations of Central Tasar Research & Training Institute, Ranchi.

Arjun was also established in Kota, Baran, Udaipur and Banswara in Rajasthan on a large scale. Natural flora of Arjun, Asan and Sal was also exploited. The plantation available in Rajasthan which is estimated around 1000 ha. would be able to help add to the national wealth and generating employment for more than a thousand person year.

**S.B. Saraswat**  
Deputy Director

Purvanchal Sericulture  
Development Project,  
Varanasi - 221 002,  
Uttar Pradesh.

### Well! Is it not T.B.?

The article published in different issues of *Indian Silk* certainly deserves applaud. The article "Health Hazards in Sericulture" by V.G. Maribashetty *et al.* (*Indian Silk*, October, 1997) talks of two major health hazards - asthma and skin diseases, whereas according to my experience, tuberculosis is the major health hazard. The two factors that gain sufficient ground for this view, are :

- Unhygienic conditions prevailing in filatures and other reeling units - high temperature, humidity and also the fumes from the cocoons.
- The poor socio-economic background of the persons employed in the reeling units necessarily will have an impact on their poor knowledge of food requirements and also to prevent T.B.

Whether my presumption has a base?

**B.S. Ghatnatti**

Gokak,  
Karnataka.

### Elaborate, please!

This refers to the article "Purvanchal main Resham Utpadan evam Paramparagat Krishi - Ek adhyan" by Dr. Pandey *et al.* (*Indian Silk*, October, 1997).

The comparison made indicated that sericulture is the best tool for successfully uplifting the rural economy in Purvanchal and is eminently suited to the conditions prevailing in the region. This calls for clarification and

elaboration on the following points:

- The reason for excluding the races authorised for commercial exploitation during summer, rainy and autumn seasons?
- The highest cocoon yield/100 dfls. (64.00 kg) was obtained during rainy season as compared to spring (50.40 kg) and autumn (52.57 kg). Is rainy the best rearing season in the region ?
- Rearing of 625 dfls. in a year (in one acre of land) consumes 10,000 kg leaf @ 1600 kg/100 dfls. with an average cocoon productivity of 52 kg/100 dfls. resulting in a high leaf cocoon ratio of 30.7:1.
- Temperature during April is very high (36-42°C, Gargi *et al.* (*Indian Silk*, March, 1997) when rearing for summer is recommended. This may lead to deleterious effect on the growth and development of silkworm larvae and harvesting 38.66 kg cocoon/100 dfls. may perhaps be difficult. Whether the brushing can be suitably advanced to third week of March to have more congenial conditions for rearing?

**Dr. Tribhuwan Singh**  
Senior Research Officer

Central Silk Board,  
Bangalore.

### Errata

This is with reference to the article "Vegetable Disinfectants for Tasar Eggs" published in *Indian Silk*, Sept., 97. The co-author's name may correctly be read as, "M.C. Dash".

**Please make your letters brief and to the point. Send your letters to the Editor.**



# Dietary Efficiency and Silk Productivity

Kanika Trivedy and K. Sashindran Nair

In the present day sericultural research arena, evolution of productive mulberry varieties and silkworm strains assumes much significance. During selection, a host of characters are taken into consideration and prioritized, based on their importance. One of the most important traits attached with great importance in leading seri-

***Dietary efficiency of silkworms plays a major role in converting the mulberry leaves consumed by them to silks and any improvement in the leaf silk conversion ability of a given mulberry genotype or silkworm race will add to its economics, aver the authors.***

culture countries like China and Japan is dietary efficiency. Unfortunately, it has been ignored totally in Indian sericultural breeding research on the trail of evolving new silkworm breeds.

Dietary or nutritional efficiency contributes considerably to the cost-benefit ratio of sericulture practice upto the level of cocoon production. The share of mulberry leaves accounts for more than 50% of the total cost of silkworm rearing.

The silkworm larva consumes all kinds of nutrients from the mulberry leaves to build its body, sustain and spin cocoons. Under different conditions, though the silkworm ingests same amount of mulberry leaves, it shows significant difference in its ability to digest, absorb and convert the leaves to silk. This arouses a reliable and comprehensive physiological character, efficiency of conversion of ingested mulberry leaves to silk or simply the leaf-silk conversion rate.

The leaf-silk conversion rate is a very important economic index in cocoon production where leaf-cocoon conversion rate is also equally considered. This character is largely different from the widely used term, leaf-cocoon ratio which is calculated on the basis of leaves fed to silkworm.

Leaf-cocoon ratio can vary from rearer to rearer, since a rigid guideline is not followed as to the quantum of leaf fed. But, on the

otherhand, the basis of calculation of the leaf-cocoon conversion rate or for that matter leaf-silk conversion rate is the precise amount of leaf ingested by a larva or a group of larvae and the amount of cocoon or silk produced from that amount of leaf. In general, a larval stage of which about 80 per cent is consumed in the 5th instar when the silk gland grows well and synthesizes the silk substances.

For example, the commercial silkworm races can yield an average of about 1.1 kg of cocoons and 0.2-0.256 kg of silk after ingesting 10 kg of fresh mulberry leaves in the 5th instar. Their leaf-cocoon and leaf-silk conversion rates are about 11 and 2-2.56%, respectively. Improving the leaf-silk conversion rate will be of great significance in enhancing productivity and economising sericulture.

In China and Japan, the sericulture scientists have realised the importance of dietary efficiency

**Table 1. Expression of LSCR**

Leaf-silk conversion rate (LSCR) (%) =

$$\frac{\text{Amount of digestion}}{\text{Amount of ingestion}} \times \frac{\text{Cocoon weight}}{\text{Amount of digestion}} \times \frac{\text{Cocoon shell weight}}{\text{Cocoon weight}} \times 100$$

$$= \frac{\text{Cocoon shell weight}}{\text{Amount of ingestion}} \times 100$$

Similarly, leaf-cocoon conversion rate (LCCR) (%) can be expressed as

$$\frac{\text{Cocoon weight}}{\text{Amount of ingestion}} \times 100$$

**Table 2. Dietary efficiency and yield performance of Bivoltine breeds/hybrids**

Sl no.	Breed/Hybrid	V Instar Ingesta/ 40,000 larvae (kg)	LCCR (%)	LSCR (%)	Ingesta/ 40,000 larvae (kg) (I-V instar)	Yield/ 40,000 larvae (kg)
<b>Pure breeds</b>						
1.	CSR 1	420.37	13.711	3.088	525.47	57.64
2.	CSR 2	449.79	13.238	2.950	562.23	59.54
3.	CSR 3	398.90	13.365	3.152	498.62	53.31
4.	CSR 4	398.35	13.290	2.759	497.93	52.94
5.	CSR 5	501.45	12.463	2.765	626.82	62.50
6.	CSR 6	482.52	10.891	2.483	603.15	52.55
7.	CSR 12	518.09	12.211	2.709	647.62	63.26
8.	CSR 13	552.05	11.524	2.580	690.06	63.62
9.	A 66	425.24	13.002	3.061	531.55	55.29
10.	A 69	405.70	12.886	2.931	507.13	52.28
11.	A 71	436.98	11.278	2.787	546.23	49.28
12.	B 71	399.97	12.955	2.627	499.96	51.81
13.	B 72	399.93	13.254	2.844	499.91	53.01
14.	1 HT	532.13	11.944	2.534	665.17	63.56
15.	2 HT	433.50	13.701	2.874	541.88	59.40
16.	3 HT	431.86	13.084	2.809	539.82	56.51
17.	KA	451.79	14.531	2.864	564.74	65.65
18.	NB <sub>4</sub> D <sub>2</sub>	453.43	12.929	2.712	566.79	58.62
<b>Hybrids</b>						
19.	CSR 1 x 4	494.40	12.449	2.432	618.00	61.55
20.	CSR 2 x 4	542.31	12.102	2.631	677.88	65.63
21.	CSR 2 x 5	519.15	12.622	2.791	648.94	65.53
22.	CSR 3 x 6	543.16	12.232	2.861	678.96	66.44
23.	CSR 12 x 6	638.03	10.799	2.584	797.54	68.90
24.	CSR 13 x 5	558.60	11.731	2.605	698.26	65.53
25.	B 71 x A 69	506.03	12.550	2.872	632.54	63.50
26.	B 72 x A 66	499.87	12.865	2.873	624.84	64.31
27.	B 72 x A 71	503.85	11.730	2.791	629.81	59.10
28.	1 HT x 2 HT	528.21	12.555	2.811	660.27	66.32
29.	3 HT x 2 HT	485.16	12.152	2.850	606.45	58.96
30.	I x NB <sub>4</sub> D <sub>2</sub>	551.51	13.416	2.714	689.39	73.99
31.	Vlc x NB <sub>4</sub> D	555.75	12.574	2.578	694.69	69.88
32.	CNR 3 x 14	556.22	10.146	2.102	695.27	56.44
33.	CNR 14 x 3	565.35	9.621	1.975	706.68	54.39
34.	CNR 10 x 4	546.36	10.532	2.151	682.95	57.54
35.	CNR 4 x 10	556.37	10.666	2.171	695.47	59.34
36.	CNR 16 x NB <sub>4</sub>	540.53	10.884	2.013	675.66	58.83
37.	KA x NB <sub>4</sub> D <sub>2</sub>	538.00	12.991	2.602	672.50	69.89

1-13 - Improved productive breeds; 14-16 - Thermo-tolerant breeds  
 17 & 18 - Existing breeds; 19-27 - Improved productive hybrids  
 28 & 29 - Thermo-tolerant hybrids; 30 & 31 - NPV tolerant hybrids  
 32-36- Hybrids from RSRS, Coonoor and 37 - Existing hybrid

and are engaged in finding effective ways to enhance leaf-silk conversion rate. Leaf-silk conversion rate can be improved by breeding desirable silkworm strains and mulberry genotypes, providing good rearing environment and nutritious leaf and also by applying some insect growth regulators.

To begin with, various silkworm breeds and hybrids evolved in Central Sericultural Research & Training Institute, Mysore were subjected to physiological studies to find out their dietary efficiency. These include improved bivoltine productive breeds/hybrids, bivoltine breeds/hybrids for special condition (e.g. thermo-tolerant) and improved multivoltine hybrids.

#### Leaf-silk conversion rate

The leaf-silk conversion rate is composed of three basic factors viz., digestibility, the ratio of transforming the amount of digested food into cocoon and cocoon shell ratio. Thus, the leaf-silk conversion rate is arrived at by relating the factors like how much ingested food could be digested and absorbed, how much digested food could be transformed into cocoon and how much cocoon transformed into cocoon shell. It can be expressed as in Table 1.

It was felt that it would be appropriate and suitable to apply this knowledge to screen the improved productive and other types of breeds and hybrids to understand their efficiency to ingest mulberry leaf and convert it to silk. A number of improved pure breeds and hybrids of bivoltine and multivoltine (either productive or tolerant to different stress conditions) were subjected to a careful and rigorous procedure. Their leaf-silk and leaf-cocoon conversion rates were determined on two feedings a day. Care was taken to ensure



**Table 3. Dietary efficiency and yield performance of Multivoltine hybrids**

Sl no.	Breed/Hybrid	V Instar Ingesta/ 40,000 larvae (kg)	LCCR (%)	LSCR (%)	Ingesta/ 40,000 larvae (kg) (I-V instar)	Yield/ 40,000 larvae (kg)
1.	95 G x CSR 5	554.12	11.738	2.432	692.64	65.04
2.	95 K x CSR 5	597.73	12.407	2.428	747.16	74.16
3.	95 L x CSR 5	585.76	12.991	2.523	732.20	76.10
4.	95 M x CSR 5	547.44	12.849	2.554	684.30	70.34
5.	BL 24 x NB <sub>4</sub> D <sub>2</sub>	532.43	12.498	2.373	665.53	66.54
6.	BL 43 x NB <sub>4</sub> D <sub>2</sub>	513.28	12.125	2.381	641.60	62.24
7.	BL 44 x NB <sub>4</sub> D <sub>2</sub>	486.71	13.074	2.616	608.38	63.63
8.	BL 45 x NB <sub>4</sub> D <sub>2</sub>	511.72	12.604	2.549	639.64	64.50
9.	PM x NB <sub>4</sub> D <sub>2</sub>	487.33	13.261	2.340	609.17	64.62
10.	BL 23 x NB <sub>4</sub> D <sub>2</sub>	462.45	12.641	2.479	578.06	58.46
11.	PM x C Nichi	346.44	13.959	2.101	433.05	48.36

1-8 - Improved hybrids for irrigated mulberry garden

9 - Existing one for irrigated mulberry garden

10 - Improved hybrid for rainfed mulberry garden

11 - Existing one for rainfed mulberry garden

the retention of leaf freshness. The total amount of food ingested by these silkworm races when two feeding schedules were followed with all other standard recommended rearing procedures in vogue was also determined. This was taken as an index for ingesting capacity and put vis-a-vis the productivity in terms of kilograms of cocoons produced by 40,000 silkworm larvae.

The data presented in Tables 2 and 3 clearly indicate that some of the pure breeds and hybrids score over the existing ones in their dietary efficiency while some are marginally better. Some improved multivoltine hybrids (Table 3) show remarkable superiority in the dietary efficiency over the

existing ones. Apart from this, it is evident that the ingestion capacity varies remarkably among silkworm breeds/hybrids. From the present work, it has become clear that the average leaf consumption/larva in bivoltine pure breeds ranges from 16-22 gm while it is 19-25 gm in bivoltine hybrids. In the case of cross breeds, the average leaf consumption/larva is 18-23.5 gm.

This will possibly open up new vistas in research and attract efforts to enhance the digestibility of silkworm to help increase the leaf-cocoon and leaf-silk conversion rates.

*The authors are with CSRTI, Mysore.*

## Question & Answer

**Sangeet Banerjee**  
Raiganj College,  
West Bengal

**Q.** Why the silkworm (*B.mori*) requires less humidity (70%) and temperature (22-23°C) and good aeration at late instar?

**A.** Silkworm is a poikilothermic animal. As a result, the physiological activities are liable to changes according to the environmental conditions.

Temperature plays a vital role in regulating the quality of cocoons. Higher temperature at later stages leads to weak larvae susceptible to diseases, inferior cocoons, thick fibers besides non-spinning larvae.

High humidity during later developmental stage causes low physiological activities, prolonged larval duration leading to rapid multiplication of pathogens causing grasserie and flacherie diseases. It also affects cocooning percentage, reelability and neatness.

Lack of proper aeration leads to accumulation of injurious gases like CO<sub>2</sub> above 1% or Ammonia in the rearing room which have a harmful effect on the growth and development of larvae resulting in increased mortality, inferior and deformed cocoons with increased melting.

Therefore, slightly lower temperature and humidity besides better aeration is recommended during later stages of development of larvae for better growth results to harvest good quality cocoons.

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# Improved Vermiculture Technology for Recycling Sericultural Waste

G.K. Srinivasababu, B.K. Kariappa, V. Thiagarajan,  
C. Srinivas and Vinod Kumar Gupta

**I**n sericulture about 60 kg. of waste is produced out of every one hundred kg. of mulberry leaf production. It is estimated that out of about eight ton of mulberry leaf produced from one acre of garden in a year, about 4 to 4.5 ton of

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***Of late, natural/organic farming is regaining momentum and sericulture is not an exception. Vermicomposting has a vital role in making organic farming a success. The authors discuss their attempts to improvise the technology further, besides its cost-effective economics and benefits.***

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waste in the form of silkworm litter, uneaten and mature leaves, twigs etc., is generated. These wastes can easily be recycled into organic manure by vermiculture technology. Regional Sericultural Research Station (RSRS) of Central Silk Board at Chamarajanagar (Karnataka) has further improved the vermicomposting technology with a view to popularise it.



**Vermiculture in cement tanks**

## **Physical structure**

Vermiculture can be practised with two cement tanks of size, 7 ft. length, 2 ft. width and 1.5 ft. height constructed inside a thatched shed of 16 x 14 ft. to protect earthworms from direct sun light and rain water. The unused space in cattle shed or backyard of house can be used for this purpose. A water channel may be provided on the roof of the tank to prevent ant attack. A wiremesh cover may be used over the tanks to check the predators like rat, frog, lizard and cats (Fig 1).

The materials required are 250 bricks, 1.5 bag cement, 0.5 cart load of sand, 3 mtr. wire mesh and wooden planks. Each tank

requires about 250–300 kg. of partially decomposed sericultural waste for each harvest. About 3.5–4.0 ton of waste is required to produce 3–3.5 ton of vermicast per year.

## **Biological organism**

The most popular species of earthworm for producing vermicompost is *Rudrillus eugeniae* (Fig. 2). These earthworms exhibit maximum activities between June and December and they will not undergo diapause. The younger worms will have better efficiency of producing more compost. The life cycle of earthworm starts from cocoon; two to three worms hatch within three weeks of its formation. The worms



## Economics of Vermicomposting

(Cost in Rs.)

Construction cost of two cement tanks	1,000.00
Construction cost of thatched shed	2,500.00
Cost of 2 kg earthworms	400.00
	<u>3,900.00</u>
Depreciation value for 5 years :	
Expenditure to be booked each year	618.00
Labour wages / year (8 mandays/harvest x 7 harvest = 56 mandays, @ Rs. 60.00 per manday)	3,360.00
	<u>3,978.00</u>
Production of vermicompost/year = 3 ton	
Cost of production of vermicompost/kg.	1.32
Revenue generated out of sale of vermicompost per year @ Rs. 3 /kg.	9,000.00
Net profit / year	5,022.00

## Field Trials

The package of improved technology of vermiculture developed by RSRS, Chamarajanagar is becoming popular among the farmers of Kollegal and Chamarajanagar areas. The below indicates details of the technology under practice in different areas :

Place	No. of farmers covered	Quantity of vermicompost produced (kg.)
RSRS, Chamarajanagar	—	1,200
Sub unit, Kinakahalli, Kollegal	29	5,000
Amchavadi	1	1,000
Sericulture Training Institute Kuderu	1	Just initiated

are matured to produce cocoons within six weeks. The reproductive potential and size of the worm depends on availability of food, space and fouling of its environment. The worm consumes food, five times more than its body weight per day.

### Controlled environment

**Temperature :** The ideal temperature required for rapid

feeding and conversion of waste is between 20 and 30°C. Bedding temperature in tanks above 35°C could be harmful to the worms. The temperature in moist bedding of cement tank is generally lower than the surrounding air because evaporation of moisture from bedding has a cooling effect. It is essential to construct the tanks under thatched shed or house with good ventilation for free circula-

tion of air to check carbon dioxide accumulation.

**Moisture :** The earthworms breath through their skin and must be kept moist to facilitate respiration. Hence, moisture of cement tank bedding should be maintained at 30–40%, by sprinkling of water, periodically. When a handful of bedding is squeezed, it is not sticking to hand, then the moisture will be about 30–40%.

**Acidity :** The pH value of the bedding should be between 6.8–7.5 for better conversion efficiency by earthworms. Avoid using silk-worm litter which has slaked or dehydrated lime, as it may kill the worms.

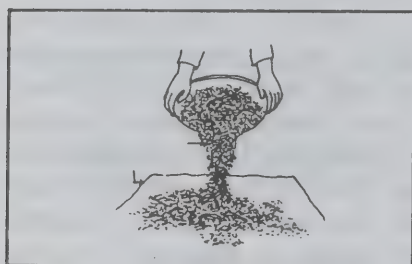
### Maintenance

**Preparation of bedding :** A major component of vermicomposting is bedding. Worm beddings are functional entities. They not only hold moisture but also provide a medium in which the worms can work. Sericultural waste should be mixed with cow dung slurry at the ratio of 8 : 1 with moisture percentage of 70–80 and allowed to decompose for 15–20 days. Water should be sprinkled whenever required. When a handful a decomposing material is squeezed, it should exude 3–5 drops of water; then, the moisture will be around 70–80%.

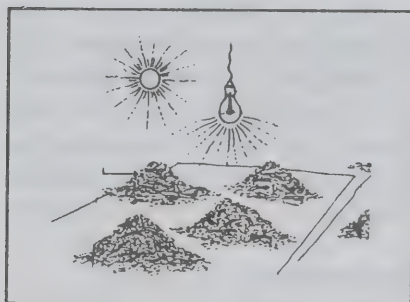
During this period, the material is turned two to three times to bring down the temperature to facilitate uniform decomposition. The ready bedding should be transferred to cement tanks. Each tank should be filled with feed mix or bedding at a ratio, as per the formula—Requirement of bedding/harvest = 5 x Initial weight of worms x 50.

In vermicomposting system, the biomass of worms is important than the number. One kg, of worms will convert about 5 kg. of

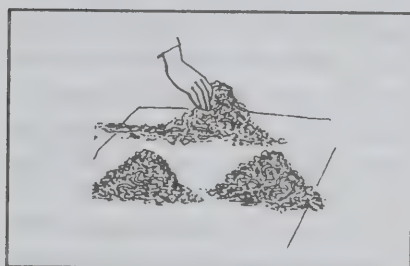
## Diagrammatic representation of harvesting technique



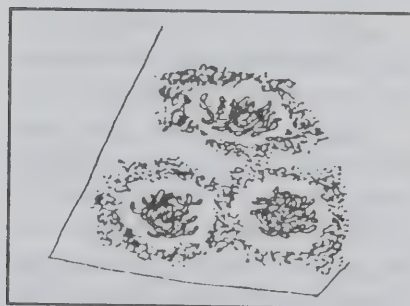
1. Dump vermi compost on plastic sheet



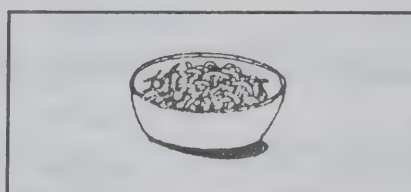
2. Make cone shaped piles under bright light



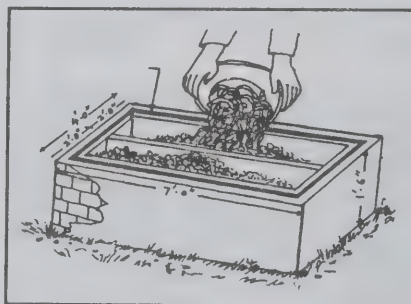
3. Earthworms go to bottom to avoid light. Remove compost from top layer/sides



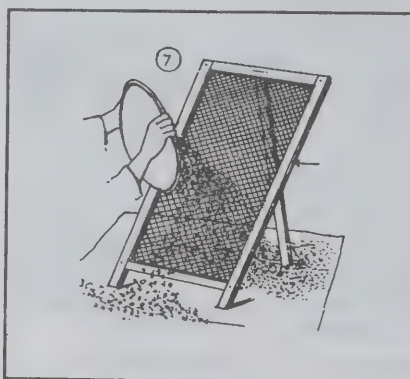
4. Masses of earthworm at the bottom of the piles



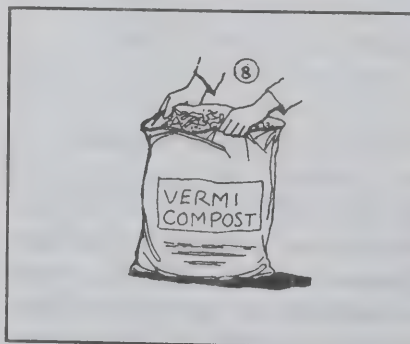
5. Place removed worms in a container



6. Transfer the worms to new bedding of cement tank



7. Sieve compost to separate cocoons and baby worms



8. Vermi compost ready for use

decomposing material per day and 250 kg. for each harvest in a period of 50 days. Therefore, each tank should be filled with approximately 250 kg. of feed mix. Spread the worms gently on the surface of bedding. Keep the light

on for few minutes over the tank and allow the light to fall on the surface of the bedding; or else, make the room bright. The worms will slowly move down into the bedding to avoid light. If any worms remain on the surface, even after

one hour, they are either dead or unhealthy and should be removed. The area should be kept dark for better conversion and the moisture should be around 30–40%.

Earthworms feed on decomposing wastes. Their digestive tract acts as a grinding mill converting the waste into vermicastings with immobilised microflora and enriched with balanced plant nutrients, vitamins, enzymes, antibiotics and plant growth hormones which are passed out of their bodies in the form of granular aggregates. The worm assimilates only 5 to 10% of the decomposed materials for its body activities and 90% will be passed out as vermicasting. When the tanks are filled with castings, the worms should be separated and allowed to new bedding of tank. If harvesting is delayed, the worms may die due to lack of food and proper environment.

**Harvesting and separation :** Harvesting and separation of worms from castings is an important phase. It also gives the worms an opportunity to move into fresh bedding. For the high maintenance system, plan to do this at an interval of 50 days. It will take two to three hours for the first time, but goes faster when one is experienced. RSRs, Chamarajanagar, has developed a simple system of harvesting and separation of worms from castings viz., *Dump and hand sorting*.

The materials required are, a plastic sheet, 100 watt, electric bulb, plastic basins, sieve with mesh size of 3 mm. and fresh bedding. Spread the plastic sheet on the ground and dump the contents of cement tank on it. Make about 8–10 cone shaped piles of the contents. One can see the earthworms all over the piles. Under the bright light, they quickly move away towards the centre of the



pile of vermicompost within 10–15 minutes. Gently remove the compost from the outer surface of each pile. When worms on the surface react to the light and retreat, repeat the procedure. Eventually, the worms will have congregated in a mass at the bottom of each pile. Collect and transfer the worms to the newly prepared bedding of the tank for next cycle. A large number of cocoons and infant worms will be present in the vermicompost. If required, they can be saved by sieving through a wire mesh. Preserve the vermicast for three to four weeks in shade, before use.

### Methods of application

Vermicast from sericultural waste contains 1.8% N, 0.6 to 0.8% P and 1% K, besides many micro-nutrients. It is superior in quality compared to farm yard manure. There are several methods of its application to the mulberry garden.

- *Sprinkling* : Vermicompost is sprinkled into a shallow, narrow V shaped trench (furrow)



*Earthworm species Eudrillus eugeniae*

dug in the garden. The trench is covered with surrounding soil, subsequently. By this method, the plants will respond immediately to the vermicompost application.

- *Pit filling* : In this method, handful of vermicompost is placed at the bottom of each pit before transplanting the

saplings. The rest of the pit is filled with soil.

*Top dressing* : The vermicompost is placed near the root zone of the plant in a pit made out of sharp implement like *Kolugudli* or crow bar for better utility.

The presence of earthworms or their cocoons in the vermicompost applied into the soil, will not create any problem. During the application, if worms are alive, they will work and aerate soil, produce castings and add nitrogen from their mucus and benefit the soil. This species of earthworms are not normally soil dwelling and require large amount of decomposing organic material to live.

The vermicast produced out of improved technology using the sericultural waste is qualitatively superior and the technology is simple, easy to adopt and above all, cost-effective.

*The authors are with Regional Sericultural Research Station, CSB, Chamarajanagar.*

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# Vijetha : An Effective Disinfectant

R.K. Datta, M. Baig, B. Nataraju, M. Balavenkatasubbaiah and T. Selvakumar

**V**ijetha is a new chemical product developed by the Central Sericultural Research and Training Institute (CSRTI), Mysore to prevent infection and spread of the diseases during silkworm rearing. It is a silkworm body and rearing seat disinfectant of unique

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***The crop loss due to diseases during rearing of silkworm in India is as high as 20-40%. Regular and effective disinfection only can keep away the diseases and ensure successful cocoon crop. Vijetha, a new disinfectant invented by CSRTI, Mysore will not only prevent all major diseases of silkworm but also help increase the crop yield, opine the authors.***

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formulation effective against all silkworm diseases viz., Pebrine, Grasserie, Flacherie and Muscardine under varied conditions. It was demonstrated in the field in 1997 and became popular amongst the sericulturists as soon they could notice significant yield

increase when applied throughout the rearing.

## **Causes of diseases**

Diseases in silkworm rearing at farmers level are the main constraints in silk cocoon production in all sericultural countries. In India, diseases are caused by microbial pathogens such as viruses, microsporidians, bacteria and fungus which result in crop loss of 20-40%. Among the pathogens, viruses such as nuclear polyhedrosis (Grasserie), infectious flacherie and denonucleosis individually and in synergistic association with bacteria (Flacherie) account for nearly 70% prevalence of the diseases. Fungal diseases such as muscardine also takes a heavy toll during rainy and winter seasons. Occasionally, pebrine caused by *Nosema* inflicts significant damage to sericulture. Loss in silk production due to this disease exceeded 1000 M.T. in 1991.

## **Spread of diseases**

The diseased silkworms in the rearing tray continuously release the pathogens into the environment along with faeces, gut juice, bleeding due to injury or breakage of fragile skin etc. The released pathogens contaminate the rearing environment mulberry etc., and cause infection of the healthy silkworms. Thus, diseases spread at an alarming rate. One diseased

silkworm in a healthy population of 100 larvae in early instar can spread the infection upto 44% in respect of nuclear polyhedrosis, 65% of pebrine, 100% of infectious flacherie and 100% of muscardine in healthy larvae. The silkworm pathogen also persists in the rearing environment for a very long time and causes diseases in silkworm.

The disinfection of rearing house and appliances prior to silkworm rearing destroys the persistent pathogen. However, the pathogens that are released into the rearing environment as well as those that could enter into the rearing house increase the disease load, later. In addition to room disinfection, periodical disinfection of silkworm body and rearing seat using an effective disinfectant such as Vijetha becomes essential to kill those pathogens and prevent the spread of the diseases during silkworm rearing.

## **Laboratory test result**

Laboratory studies on the efficacy of Vijetha indicated its vast potential to reduce the spread of diseases in silkworm rearing. The application of Vijetha has led to substantial reduction in the spread of Pebrine, Grasserie, Flacherie and Muscardine diseases which could reach disastrous level when the infectious source is only 4-6% in the rearing bed (Table 1).



**Table 1. Efficacy of Vijetha in prevention of spread of diseases during silkworm rearing**

Disease	% Mortality		
	Inoculated control	Vijetha treatment	Reduction in spread
Muscardine	100	2	98
Grasserie	77	15	62
Pebrine	74	12	62
Infectious flacherie	68	10	68

### Field trial

Field trials of the product in different sericultural areas in Karnataka, Andhra Pradesh and Tamil Nadu provided most promising results. An improvement in cocoon yield by 10 kg was recorded which is an additional gain of 30% to that of production (Table 2). Season had no effect on the efficacy of Vijeta.

### Mode of application

Vijetha is in powder form and its application is simple. It is dusted by a duster or a thin cloth over the silkworm body and rearing seat, after each moult before the resumption of feeding as well as on the fourth day of final instar. It is carried out after bed cleaning and care is taken to remove any eatable mulberry leaf from the rearing bed before dusting. The dusting

should be uniform and cover all the silkworms and rearing seat. Three kg of Vijetha is required to dust the silkworms of 100 dfls. The quantity and schedule of dusting for 100 dfls is as follows :

Schedule	Quantity (gm)
After 1st moult, before feeding	50
After 2nd moult, before feeding	100
After 3rd moult, before feeding	550
After 4th moult, before feeding	800
On 4th day, final instar	1500
<b>Total</b>	<b>3000</b>

**Table 2. Performance of Vijetha at farmers level**

Treatment	No. of farmers, crops tested	No. of dfls covered	Yield/100 dfls (kg)
Vijetha	106	11856	47.16 ± 4.33
Control	64	8725	36.40 ± 4.87
Improvement over control : 10.76 kg/100 dfls.			
Cost benefit ratio : 1 : 12			

### Shelf-life and storage

The shelf-life of the product is one year. Its effectiveness reduces, if the packet containing the powder is kept open. It should be stored in cool and dry place.

### Precautions

The effectiveness of the product is pronounced in silkworm rearing where all the precautions are taken for disinfection of rearing houses, appliances and practiced hygienically. It has no effect on the infected silkworms. Since it is a dust formulation containing chemicals, protection of nose, eyes and ear is essential. The product should be kept out of the reach of children.

### Cost-economics

The product is being manufactured and sold by CSRTI, Mysore through Regional Sericultural Research Stations, Research Extension Centres, Seed Production Centres and Department of Sericulture in different states at a retail price of Rs. 30/- per kg. The use of Vijetha has improved the cocoon yield by 10.76 kg per 100 dfls. which amounts to Rs. 1,076 to 1,500/- at the rate of Rs. 100 - 150/- per kg of cocoon. It results in cost-benefit ratio of 1:12.

It is expected that the large scale application of Vijeta may help increase the national cocoon production by 25% which will be a boon to the silk industry.

*The authors are with CSRTI, Mysore except the second, who is with NSSP, Bangalore.*

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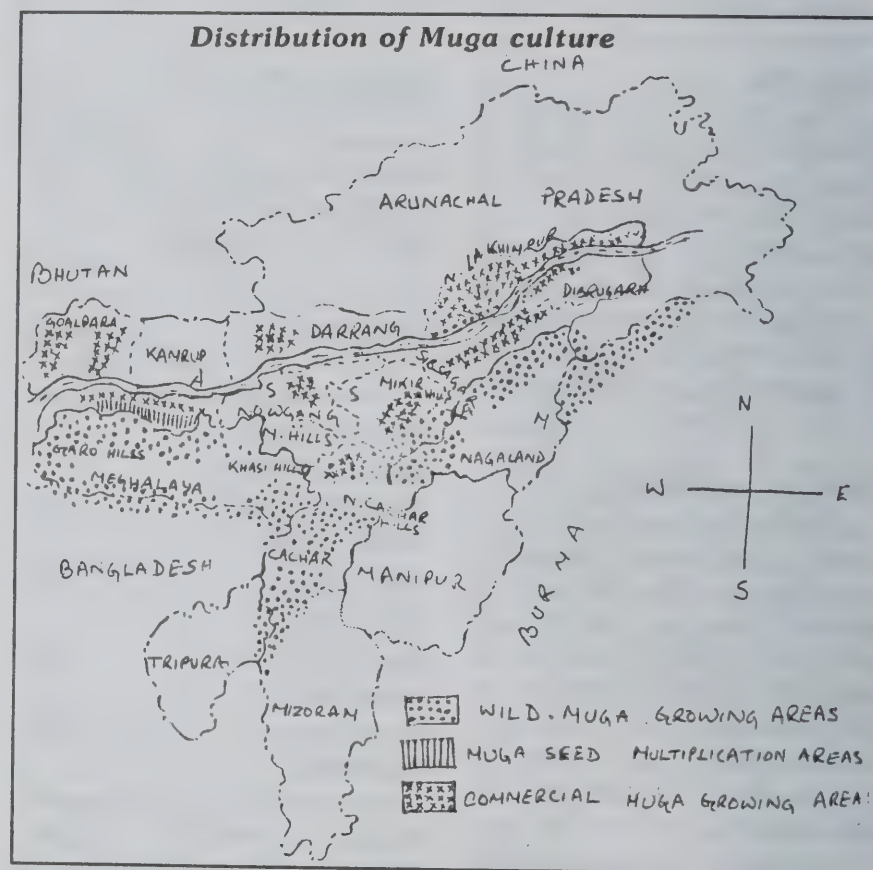
# Blue ! The Breed is True !!

Monica Chaudhuri (née Mukhopadhyay), Nizora Bhuyan-Barua and  
Shyam Sundar Singh

**T**he states of the North-eastern India spread over 2,55,000 sq. km., occupying 7.7% of the total geographical area of our country. Sizeable area of the North-east being endowed with a bountiful nature - prolonged and heavy monsoon alternating hot

**The muga silkworms that produce fascinating golden yellow silk are rich in their body colour too. Green being common, they are also found in orange, yellow and blue colours. The Blue breed is reported to be stronger, hardier and more productive than the conventional green. The authors emphasize the immediate need for further studies on the Blue breed for better utilization.**

and humid summer - cold and dry winter - salubrious autumn and spring coupled with rich sandy loam and acidic soil - serves as a perfect ecological niche congenial for the growth and development of muga silkworm. Muga culture substantiate the economy of the region to a great extent. Muga worms (*Antheraea*), as the specific name *assama* indicates, are particularly



inhabitants of erstwhile united Assam, naturally distributed along the foot hills of the Himalayas covering Assam valley, a bit of adjoining Terrai in West Bengal, Garo, Cachar and Naga Hills extending upto Burma (Fig. 1).

Muga larvae are predominantly green in colour. But, polymorphism in respect of larval body colour is also encountered among normal green muga population. Prof. S.N. Chaudhury (1981) reported the existence of three additional colour morphs - orange, yellow and blue which express themselves intermittently and then

get either masked or eliminated from the environment. During the 70s, yellow and orange larval variants surfaced in Central Muga and Eri Research Institute, Titabar in Jorhat and in Agia in Goalpara district of Assam, respectively. *Inter se* crossing was resorted to between lines of orange and green. The resultant  $F_1$  generations were test-crossed. The segregation ratios into green and orange larvae from the successive generations established that the difference of a single gene was the determining factor for green vs. orange larval body colour in muga



**Table 1. Larval mortality due to disease incidence in Blue larvae vis-a-vis Green larvae in Muga Silkworm**

Blue Generation	Crop/Season	Bacterial Blue	Viral Green	Blue	Green
1st	Aghenua/'95 (Nov.-Dec.)	23.35	1.46	21.16	2.25
2nd	Late Jarua/'96 (Jan.-March)	25.19	7.76	21.51	18.71
3rd	Baisakhi (Apr-May)	Nil	Nil	Nil	Nil
4th	Aherua (June-July)	10.91	2.53	Nil	2.17
5th	Bhodra (Aug-Sept)	11.01	32.08	32.43	24.95
6th	Late Bhodra (Sept-Oct.)	8.58	20.37	9.94	23.34
7th	Aghenua	10.81	10.82	5.18	12.93
8th	Late Jarua/'97	11.32	8.86	2.36	3.20
9th	Baisakhi	0.42	4.05	1.05	11.21
10th	Aherua	1.15	8.41	4.09	10.47
11th	Bhodra	15.36	30.61	11.97	25.21
Average		12	13	11	13
Generation is referred only in case of Blue variety * Blue excelled over the Green					

and allele responsible for green body colour dominates completely over the orange. Blue coloured larvae in muga existed about one hundred years ago and subsequently, faced extinction. However, Dr. K. Thangavelu *et al.* (1988) opined that the wild population of muga worms in natural habitat does exhibit colour polymorphism and blue morphs maintain themselves in the normal green population at the ratio of 1:3000.

A phenomenal event took place during Autumn (Sept-Oct) crop rearing in 1995.  $P_3$  rearing was in progress for production of grand parent seeds at the P-3 units in Rompara and Adokgiri under Muga Seed Development Project. The muga dfls were supplied from  $P_4$  stations at Tura and Mendipathar, all situated in Meghalaya. Among the III instar lar-

val populations having normal green body colour, larvae bestowed with greenish blue body colour and amethyst-coloured setae were noticed in the ratio of 1:1850 and 1:1764 at  $P_3$  units of Rompara and Adokgiri, respectively. The phenotypic expressions of these blue morphs were same as the green ones except the body colour. Upto early III instar, no colour differentiation could be made among the larvae. Gradual transformation in larval body colour took place from greenish blue in late III instar to whitish blue in mature larvae. Cocoons spun were much lighter in colour - rather whitish than those spun by normal green muga larvae which were golden yellow. Since their isolation, blue muga worms have been maintained through successive generations in two of the MSDP  $P_4$  units as pure lines. Till Autumn

1997 they have completed 12 generations and are breeding true.

A quick glance of rearing performances and the larval mortality due to bacterial and viral diseases enumerated in Tables 1 and 2 would perhaps not generate any interest. But, they do deserve a second glance. Under the same set of biotic and abiotic factors, the populations of blue muga suffered a great deal from bacterial and viral diseases in the first few generations right after their isolation. But thereafter, they seem to have acclimatized and appear to be less susceptible to these diseases than green muga (Table 1). This supports the view of Prof. S.N. Chaudhury (1981) that ".... blue (muga) larva was stronger and hardier than the other varieties (of muga) ...."

Yet, the possible reasons for their getting apparently wiped out from the population in the past may be attributed to human bias. Green muga are preferred by the rearers as being reared outdoor on the host plants as the larval body colour acts as a camouflage against pests and predators. Nevertheless, the blue breed compounded themselves alongwith the green muga population and sustained themselves in the population because of polymorphic equilibrium. Table 2 enunciates that during winter (Jan-Mar) of 1996 and 1997, Summer (April-May) and Autumn (Sept.-Oct) of 1996 and late monsoon (Aug.-Sept) crop of 1997, moths of blue muga laid more eggs than their green counterparts. The summer (April-May), monsoon (June-July) of 1996 and 1997, autumn (Sept-Oct) of 1996 and late monsoon (Aug-Sept) of 1997 witnessed more recovery of seed cocoons from each dfl of blue muga reared. Even during summer and autumn of 1996 and summer of 1997 onwards, more disease

**Table 2. Salient rearing performance of Blue vis-a-vis Green Muga (Pooled Data)**

Blue generation	Crop/season	Av. fecundity		Hatching %		Cocoon wt.		Shell wt.		SR%	
		B	G	B	G	B	G	B	G	B	G
1st	Aghenua/'95 (Nov-Dec)	174	176	96	97	5.12	5.25	0.45	0.48	8.79	9.14
2nd	Late Jarua/'96 (Jan-Mar)	161	146	90	93	4.09	4.31	0.34	0.39	8.31	9.05
3rd	Baisakhi (Apr-May)	135	115	85	83	6.50	7.69	0.65	0.6	10.0	7.80
4th	Aherua (Jun-Jul)	210	210	96	93	6.54	6.84	0.58	0.66	8.87	9.65
5th	Bhodias (Aug-Sep)	158	168	84	84	7.25	6.62	0.68	0.61	9.38	9.21
6th	Late Bhodias Sep-Oct	225	189	85	73	5.74	6.77	0.54	0.64	9.41	9.45
7th	Aghenua	150	176	90	96	4.68	4.66	0.43	0.42	9.19	9.01
8th	Late Jarua/'97	148	140	80	90	3.52	5.2	0.39	0.4	11.08	7.69
9th	Baisakhi	100	171	95	87	5.82	6.53	0.59	0.64	10.14	9.80
10th	Aherua	170	195	92	89	6.44	6.51	0.67	0.65	10.4	9.98
11th	Bhodias	188	171	88	85	5.32	5.91	0.46	0.51	8.647	8.63
Average		165	169	89	88	5.55	6.03	0.53	0.55	9.47	9.04

Blue generation	Crop/season	Dfl:cocoon		Cocoon:dfl		Dfl : Dfl		Larval Period	
		B	G	B	G	B	G	B	G
1st	Aghenua/'95 (Nov-Dec)	1 : 31	1 : 158	3.76 : 1	2.31 : 1	1 : 8	1 : 68	35	37
2nd	Late Jarua/'96 (Jan-Mar)	1 : 73	1 : 95	4.1 : 1	3.64 : 1	1 : 4	1 : 24	44	38
3rd	Baisakhi (Apr-May)	1 : 33	1 : 29	2.64 : 1	3.09 : 1	1 : 12	1 : 8	27	24
4th	Aherua (Jun-Jul)	1 : 140	1 : 129	2.4 : 1	2.36 : 1	1 : 52	1 : 54	24	26
5th	Bhodias (Aug-Sep)	1 : 5	1 : 29	3.57 : 1	2.57 : 1	1 : 1	1 : 10	22	24
6th	Late Bhodias Sep-Oct	1 : 128	1 : 49	3.88 : 1	2.89 : 1	1 : 32	1 : 16	26	25
7th	Aghenua	1 : 112	1 : 113	5.64 : 1	2.38 : 1	1 : 19	1 : 47	40	50
8th	Late Jarua/'97	1 : 75	1 : 85	4.43 : 1	2.37 : 1	1 : 17	1 : 36	42	35
9th	Baisakhi	1 : 90	1 : 90	2.39 : 1	2.67 : 1	1 : 37	1 : 33	25	32
10th	Aherua	1 : 124	1 : 118	2.37 : 1	2.45 : 1	1 : 49	1 : 42	24	22
11th	Bhodias	1 : 87	1 : 40	2.97 : 1	2.65 : 1	1 : 26	1 : 12	26	24
Average		1 : 82	1 : 85	3.47 : 1	2.67 : 1	1 : 23	1 : 32	30	31

B connotes "Blue" & G connotes normal "Green" muga silkworm generation is referred only in case of Blue variety.  
 \* Blue excelled over the Green

free layings have been brushed in case of blue muga.

Are these only freak of nature or the blue muga worms have the genetic make-up for higher degree of resistance against bacterial and viral diseases? - Do they have inherent contrivances for more

ovulation and physiological potential to lay more and quality eggs? Multilocational trials would perhaps be the answer for ascertaining the stability of blue breed. Thorough studies on the physiology, genetics and breeding behaviour of blue muga in conjunction

with post-cocoon characters is, infact the need of the hour.

*The first two authors are with Muga Seed Development Project, Guwahati (Assam) and the third with MSDP P<sub>4</sub> Station, Tura, Meghalaya.*



# Silk Industry of Assam : A Perspective

Prabin Baishya

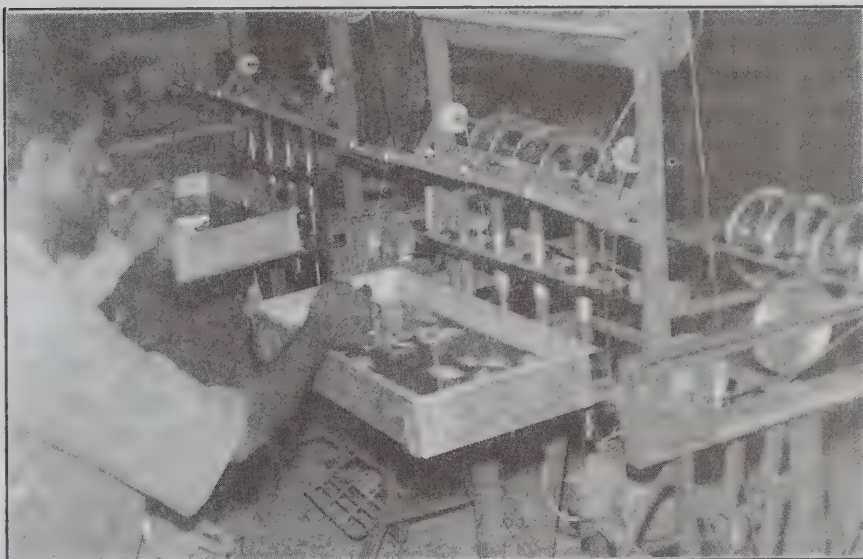
**T**he history of sericulture in Assam can be traced back to the 3rd century B.C. In his *Arthashastra*, Kautilya mentions that several regions of ancient *Kamarupa* (Assam) had produced three varieties of silk fabrics, viz., *Dakula*, *Khauma* and *Patrorna*. Historians have identified *Dakula* as Muga (*Antheraea assama*), *Khauma* as Eri (*Philosamia ricini*) and *Patrorna* as Patar or Patta (Mulberry).

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***Muga and eri culture, although a matter of tradition in Assam, have great potential to become good foreign exchange earners for the country provided they could opt for improved techniques and produce better quality products. The author dwells in detail on the research and extension inputs needed by them to do better.***

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Some chronicles of the Ahom period have also made references to silk products woven by a Tanti caste in the 17th century. Ample references are, however, available in English literature of the 19th



*Muga reeling machine*

century. According to "An Account of Assam" by Francis Hamilton, Assam's annual exports of muga yarn and fabrics to Bengal during 1808–1814 were 65 Maunds (24.26 qnts.) and 75 Maunds (nearly 28 qnts.), respectively. William Robinson wrote in 1941 that while plantation of mulberry was done only by some families for their own use, for the members of the royal families and the *grandees*, every cultivator had a patch of land in his homestead, full of *Ricinus communis* for rearing eri – the fabric of the common. Muga culture was also widespread and its dress was considered rich and valuable. Eri and muga fabrics were also popular among the Bhutanees and Tibetans.

Sericulture in Assam, though

practised since centuries, has remained a subsidiary avocation of a section of the farmers mainly due to technological stagnation at the stages of reeling, spinning and weaving. Muga and eri cultures are practised widely in the state, while mulberry is negligible and tasar is a recent introduction.

## **Muga culture**

Muga is reared out doors unlike mulberry and eri. The larvae are fed on the leaves of Som or Soalu trees, grown 10–12 meters high in the nature. Since reared in open, there are many enemies like crows, bats, owls etc., to the muga silkworms and a constant vigil is required. Good seeds are not available and mortality rate of the larvae is as high as 30–40%. Hence, the number of sericultural

villages has declined from 8669 in 1975-76 to 8127 in 1994-95. The number of families practicing sericulture has, however, increased marginally to 1.93 lakh in 1994-95 from 1.61 lakh during 1975-76. The number of muga rearing families has also gone up marginally from 26000 in 1990-91 to 28400 in 1994-95. The production fluctuates from year to year as muga cocoon harvest depends largely on the vagaries of the climate. For example, the cocoon production which was 4144 lakh in 1990-91 declined to 3995 lakh in the following year. Similarly, only 3042 lakh cocoons were harvested in 1992-93 while the out-put increased to 4316 lakh in 1994-95. (Muga cocoons are counted by units of thousand or lakhs; one thousand cocoons yield 175-200 gm. of yarn). This output is, however, insufficient for producing the traditional fabrics. The demand is rising, with growing consumerism.

Muga fabric has a great demand both outside the state and the country; but outdoor rearing of muga cocoons and shortage of seed cocoons are posing problems for taking up large scale production. In fact, until now no research work has been successful in evolving a hybrid seed for indoor rearing. Prof. J.N. Talukdar of Institute of Advance Study in Science & Technology, Guwahati working on indoor rearing of the natural seed worm, holds that if the larvae can be reared upto third moult by feeding plucked leaves, they can easily be reared upto the last stage of fifth moult by supplying leaves, four or five times a day. The larvae have a tendency to escape to the wilderness in search of food after hatching. This tendency can be checked by a sand barrier on the trays. The farmers of Boko and Karanga areas

## MUGA : Production and Marketing Constraints

Mamta Borgohain-Sarma and Monica Chaudhuri  
(nēē Mukhopdhayay)

**M**uga silk yarn production has been a traditional occupation of the people of Sualkuchi, a suburb, just seven km. away from Guwahati, the capital of Assam. The consumption is largely confined to the local market. The consumers have a cultural and sentimental attachment to this golden yellow silk and seem to procure it at any cost. The lack of awareness about the 'quality', has led to the flooding of the market with substandard and dubious quality muga silk fabrics manufactured by cheap and crude methods. Besides, the muga reeled yarns are generally woven on the fly shuttle looms and hence, the need for improving the yarn quality has not been felt. As a result, the traditional methods and reeling devices are still in vogue.

Usually, the weaving units and

business enterprises are also engaged in the muga yarn production. The muga cocoons, which are golden brown in colour are not available in Sualkuchi or its vicinity. They are procured from the rearers in the remote villages of the upper part of Assam. At times they come from a few villages of Meghalaya and Arunachal Pradesh. The cocoons are packed in bamboo baskets or gunny bags and transported to Sualkuchi by road or river. The cocoons are stifled and stored for subsequent sale or reeling. Generally stifling is done by smoking or sun-drying. In exigencies, the cocoons are kept on a sieve over a drum, cut open at the bottom and placed over a fire place.

Managing everything from collection of cocoons to yarn and fabric production by a single



*Sun drying of muga cocoons on roof top*





**Muga reeling on 'Bhir'**

person or family is somewhat a cumbersome task. It also calls for heavy investment. As a consequence, many traditional muga silk producing families have been diverting their business either to tasar to mulberry silk weaving as they are easily available in the local market at a cheaper rate. Of late, blended fabrics have come into the market. The muga weaving units are using tasar yarn along with muga to reduce the cost of production. There are instances where fabrics blended with dyed polyester or mulberry yarns have been sold as pure muga fabric.

The reeling is normally done by the females in the workshop of the weaving units or in the houses of the reelers of Sualkuchi and surrounding villages. Apart from Sualkuchi, places like Palashabari and Bijaynagar also contribute to the muga silk business. The good cocoons are reeled into yarn for fabric. The damaged cocoons and reeling waste are sold to customers from other states mainly Bihar. Recently, the muga yarn from Palashabari and Bijaynagar is being purchased by an export-oriented company based in Calcutta. This has provided a good market outlet.

The reeling activity is done mostly after the harvest of the commercial muga crop i.e., *Jetua*—spring crop (May–June) and *Katia*—Autumn crop (October–November). The quality of yarn and recovery percentage are better in *Katia* cocoons than the *Jetua*. Thus, maximum quantity of cocoons is procured after the harvest of the *Katia* cocoons. The cocoons produced during other seasons viz., *Aherua* (June–July), *Bhodia* (August–September), *Ahinla* (September–October), *Aghenua* (November–December) and *Jarua* (January–March) are also used for reeling; but their yarn is said to be inferior in quality and used for weft only. The cocoon quality not only varies from season to season and location to location, but also on the basis of food plants on which the silkworms are reared. The price too varies accordingly.

The constraints of muga silk industry are visible from almost all spheres. Traditional and obsolete techniques of reeling, stifling, storing, sorting and re-reeling on one hand and absence of standards as well as sound marketing system, on the other are among the major hurdles that hinder the development of the muga silk industry. The attempts to introduce better reeling–cum–twisting machines though has generated interest among many a weaver and business unit, it is yet to catch up on a major scale. It is rather hard to break the barrier of traditional concepts. The future of the industry largely depends on the quantum of technological advancement that could be injected into and accepted by the industry. The need, perhaps, is a stitch in time that could help restore the glory of the golden yellow silk.

**The authors are with TSTC, Sualkuchi and MSDP, Guwahati, Assam, respectively.**

of Kamrup and Jorhat districts have shown keen interest in the new method of rearing. It minimises not only the loss due to mortality of the larvae, but also the labour involved.

Reeling of muga cocoons is done on a traditional basin. According to Robinson, "the instrument used for winding silk is the coarsest imaginable". In this process, the thread does not get the required twists and the filaments remain split. It impedes the speed of the reed and the shuttle of the handloom, particularly during the rainy days when humidity is high and while the length of the yarn also remains less as it is not well-stretched in the reeling process.

### **Eri culture**

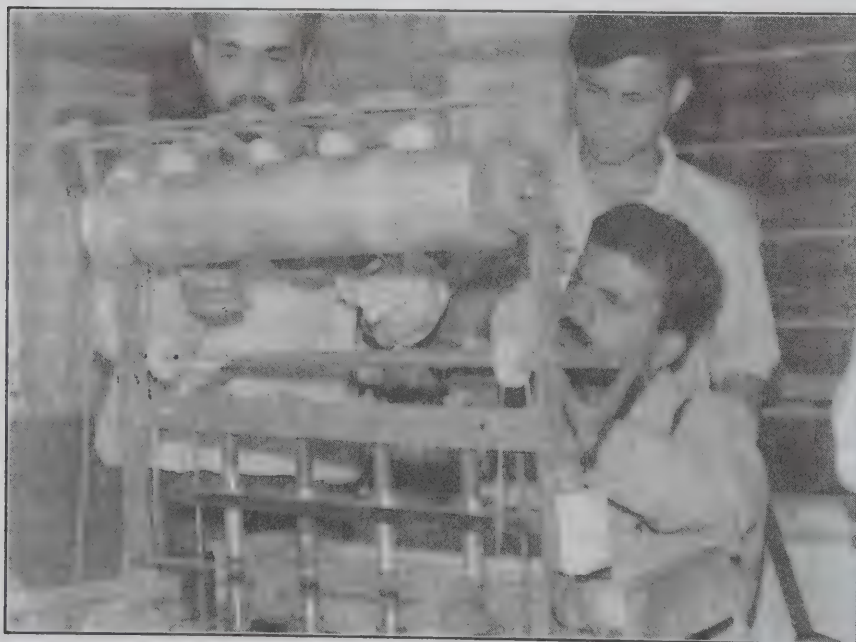
Eri culture is a speciality of the North-eastern region. Of late, it has spread to some areas of West Bengal and Bihar also. In Assam, the number of families engaged in eri culture has increased from 52,900 in 1980–81 to 1,28,000 in 1994–95. The cocoon production has gone up to 5,80,000 kg. from 1,82,000 during the same period. The eri cocoons are spun for yarn in the traditional way. The cocoons are boiled and opened to remove the pupa. Subsequently, they are flattened like slivers and put on the top of a small stick. The stick is held in the left hand and the fibres from sliver are drawn by the right hand according to required yarn size and joined to the *Takli* (locally called *Takuri*) of 30–35 cm. long bamboo stick with a small weight at the bottom. When rotated by fingers it gives the twist to the thread which in turn rolls round a reed stem in the stick. *Takli* spinning also cannot cement all the fibres uniformly due to which the speed of the throw shuttle handloom is impeded. One female



## Reeling Recipe

The muga reeling is done on a traditional device known as *Bhir*. It is also referred to as *Bhowri* or *Muga-hal*. There are many machines developed for production of muga yarn, but none of them has been accepted by the user of Sualkuchi. *Bhir* is a simple device. It consists of an open deep frying pan made of iron to serve as a reeling basin and a wooden stand with a slim cylindrical rod attached to a large wooden or iron wheel at one end. Two persons can reel 500 cocoons in a day on this machine and will earn about Rs. 25. Prior to reeling, the cocoons are cooked in an iron deep frying pan containing alkaline solution. The cooking recipe and technology resorted to by the reelers vary from unit to unit.

Approximately 40 gm of  $\text{Na}_2\text{CO}_3$  is mixed in six to seven litres of water where 500 cocoons are cooked for 15–20 minutes till the cocoons become soft and slippery. The cocoons are deflossed one by one manually, till a single filament is traced. The deflossed cocoons are placed floating in the reeling basin which is kept over an open fire to keep the alkaline solution in the basin warm. The filaments from the cocoons are taken and passed through a loop on a wire or over a slender smooth stick fitted on top of the reeling basin. It is again picked by the right hand and rolled over the left fore-arm of the reeler to impart two to three twists per inch. Then, the filament is wound on the bamboo reel fitted to the cylindrical rod of the *Bhir*. The reeler and helper sit on the ground facing each other. The helper controls the uniformity and the number of filaments in the yarn. For warp, filaments from 7–8 cocoons and for weft, filaments from 10–14 cocoons are used. The reeled yarn is dipped in water and re-reeled into wooden frame of 1.28 metres size, forming hanks of about 40–50 gm. These hanks are smaller in size and lesser in weight than that of mulberry hanks. The yarn in the hank is without any diamond formation as the re-reeling device does not have the traverse system. There is a need to standardise the hank size and the yarn should be made free from  $\text{Na}_2\text{CO}_3$ .



Muga winding machine

spinner (male generally do not do it) normally spins about 20–25 gm. of yarn out of 25–30 gm. of cocoons a day and earns about Rs. 2 (Khadi and Village Industries Board, Assam offers the highest rate of Rs. 22 per 220 gm. of yarn out of 250 gm. of cocoons). The women folk of poor families spin for wages to supplement their income, while others do it for own use.

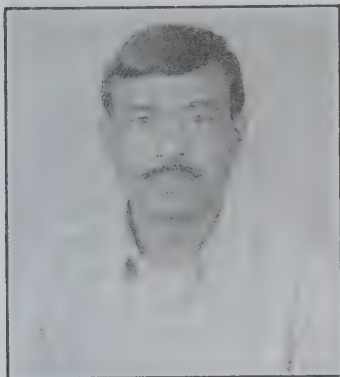
### Technological upgradation

Eri weaving is normally done on time consuming throw shuttle handlooms as fly shuttle handlooms are not suitable because of split fibres of the yarn. On the other hand, weaving of mulberry and muga fibrics is done on the fly shuttle loom. The weaver can weave three metres on fly shuttle loom as against hardly one metre a day on the throw shuttle. Therefore, the quality of the cloth varies from loom to loom depending on the skill of the weaver implying absence of quality control in texture (number of picks per inch) besides length and breadth. The fly shuttle loom in Assam does not have the semi-automatic devices like letting off the yarn from and taking up the fabric round the beam. Even the temples are pinned into the fabrics making small holes on the borders in the absence of advanced pressed type metallic temples used elsewhere in the country.

Thus, the entire manufacturing process of silk has remained traditional since centuries. Yet, spinning and reeling techniques have been upgraded to some extent. In the sixties, one pedal-driven device known as *Trivedi Charkha* was introduced for muga reeling and eri spinning; but it could not attract the attention of the reelers

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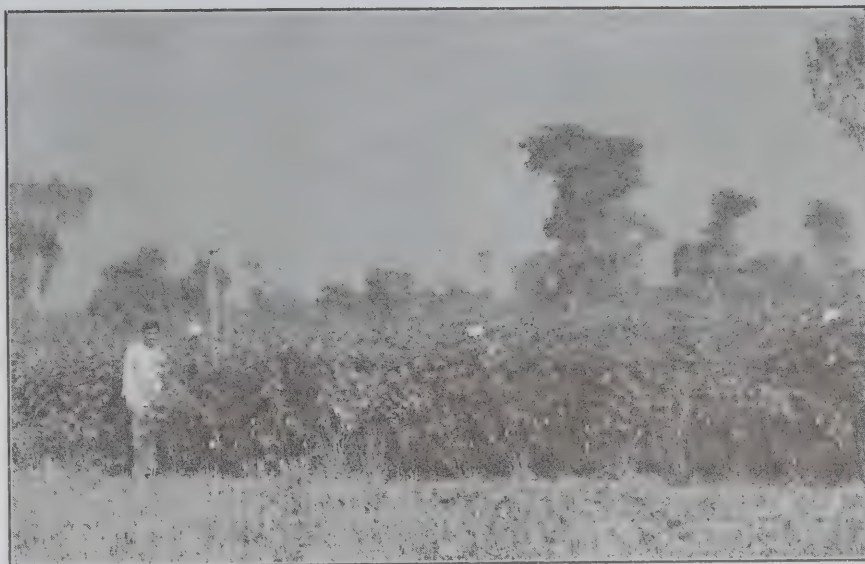
*Md. Rabiul Islam*

**R**earer and reeler - rolled into one - that is Md. Rabiul Islam, an ingenious man hailing from Malda, West Bengal. He has climbed the ladder of success in sericulture by manoeuvring the technologies and package of practices evolved by the Central Silk Board and has no impudence to admit it candidly.

Starting off as a modest reeler in 1971, by extending a helping

***Success pursues those who have grit, perseverance, determination and sagacity. This is true of Md. Rabiul Islam also, a traditional rearer-cum-reeler of Malda, West Bengal. 'Indian Silk' talks to this successful man, who is an adopted progressive reeler by CSTRI as also a beneficiary of Entrepreneurship Development Programme (EPD) conducted by CSB. Excerpts.***

## A Saga of Sagacity



*Lush green mulberry garden of Md. Rabiul Islam*

hand to his father, who was a marginal farmer owning one Bigha mulberry land, Islam's plunge into the sericulture took off as a traditional rearer in 1981, when he replaced his indigenous mulberry plantation of Kajali with the improved  $S_1$  variety. Although faced a crop failure, he was undaunted. In 1982, he adopted the improved package of practices recommended by CSB for mulberry plantation and silkworm rearing and all this turned out to be a watershed in his brush with sericulture. In an area of 4.5 bigha land, he has adopted row system. He also supplies mulberry cuttings to other farmers to help them improve production.

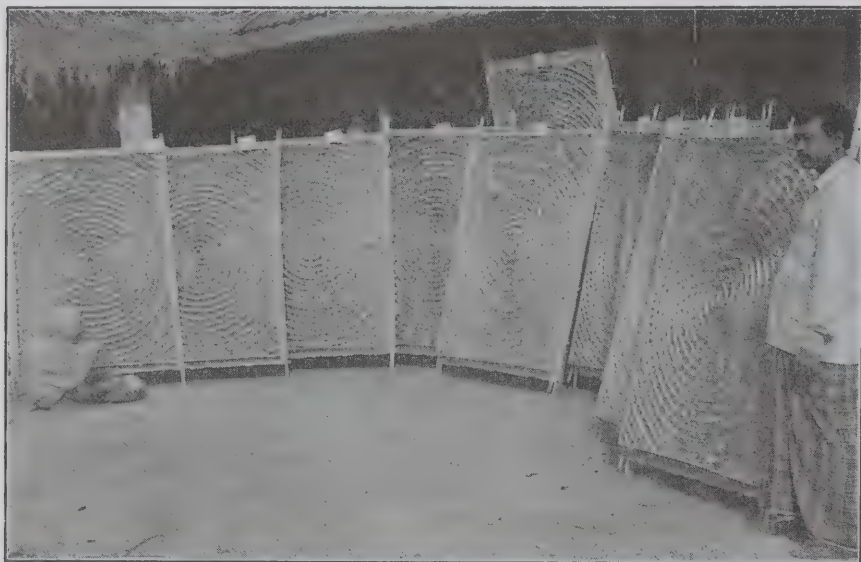
'Irrigation improves moisture of leaves as well as quality', opines Shri Islam. He applies fertilizers as prescribed by Central Silk Board.

According to Islam, there is a changing scenario in the establishment of improved mulberry varieties over traditional/local.

Islam adopted PM x Bi race of silkworm first and later N x G because of its better yield. His major crop is N x Bi followed by N x G and PM x Bi.

He has a model rearing house and practices branch feeding from third stage onwards. He also maintains a separate chawki garden. He disinfects twice a crop - once after spinning and again 10 days before seed arrival - using bleaching powder. Chawki rearing is also practised in the same room. He follows branch system of feeding.

Islam's perseverance and steadfastness bear testimony to the fact that he is now the owner of 'Sanji Quality Raw Silk Industry', a registered small scale unit at Chaspara in Malda district where rearing and reeling are conducted under one roof. Excellence has pursued him in the form of an award for the 'Best Reeling Unit' of Malda during the year 1996.



*Successful crop brings smile on the face of the rearer*

Shri Islam has focussed on the evolutionary trend of the charkha to Ghosh reeling and improved cottage basin. He asserts that, 'productivity is more in improved cottage basin to the extent of 2.4 kg over Ghosh reeling machine at 1.8 kg'.

In 1995, he opted for cottage basin with five ends and introduced the following changes to suit the local conditions -

- Individual brushing unit with common oven.
- Jet-bout system for easy

casting.

- He has adopted centralised heating system developed by SCTH/CSTRI, Malda to heat the water in the basin.
- Ghosh reeling machine instead of mud-basin. He is using aluminium basin with improved oven developed by SCTH/CSTRI.
- He is using cottage basin economic oven for effective cooking and reeling.

Shri Islam vouchsafes that the 'Economic oven' supplied by CSB

is fuel efficient and smokeless. Owing to these modifications, he is getting better quality yarn, more neat and clean.

The first man under cottage basin in Malda sector, Shri Islam says that, 'about 40 reelers have adopted the modified cottage basin. He is also using another cottage basin reeling machine developed by CSTRI, Bangalore, for West Bengal condition on lease basis for popularisation of the machine. He is an adopted reeler of CSTRI for implementation of its new technologies.

Shri Islam is practising stifling by using the 'Hot chamber' made available by Demonstration-cum-Training Centre, Malda. This helps improve the quality of yarn especially during winter', avers Islam.

'Hot air drying chamber with 120 kg. capacity is proving positive under West Bengal conditions', feels Shri Islam. There is a felt need to establish 40 more such units to improve the local requirement. According to him, 'degumming loss is more in hot air drying than sundrying'.

'Oxypon - WS' - a water softening chemical developed by CSTRI is used by him for correcting the water hardness.

Shri Islam says that a reeler can be a good twister also. For this purpose, he plans to undertake twisting also shortly as a part of expansion programme which would fulfil his cherished dream of undertaking rearing, reeling and twisting under one roof.

World Bank team visited his unit in 1989 and 1990 and was very much impressed by the quality of yarn.

An EDP participant in 1995, Shri Islam wants more extension support from the agencies engaged in promotion of sericulture. He was also a member of the Research Advisory Committee



*Cocoons are made ready for stifling*





*Conversion of cocoon into yarn - Reeling in progress*

(RAC) of CSB from 1991-1994. A school-final, earlier working as a school teacher, he helps stu-

dents in pursuing their Ph.D. in sericulture. He is a member of productivity club and knows about

its significance in sharing common problems and finding solutions.

Not to be left behind, Smt. Most Modira Bibi, his wife, is rendering a helping hand to her husband's pursuit of success. She has won the Best Woman Entrepreneur Award for 1996 from the West Bengal Government. She has also attended a seminar on women in sericulture.

It may not be an exaggeration to deduce that Shri Islam is an epitome of success leaving an indelible mark of sagacity, ingenuity, perseverance and determination.

**(Interview by T.G. Rajappan and Mukund V. Kirsur, Indian Silk CSB, Bangalore with inputs from Deputy Director, SCTH, Malda.)**

*Contd. from page 20*

## **Silk Industry of Assam : A Perspective**

and spinners. Central Silk Technological Research Institute (CSTRI) of Central Silk Board has introduced power-driven machine for mulberry, muga and tasar reeling and eri spinning. The machine has four spindles of which three can easily be used by one person for reeling 1000 muga cocoons in six hours, provided deflossing of the cocoons is done additionally. Two such machines are on demonstration at Sualkuchi and Palashabari. It is reported that the quality of the muga yarn reeled on this machine is far better than that of Bhir. It gives good twist to the thread which in turn eliminates the splits of the filaments, a common problem in Bhir reeling.

Shri Bhabesh Kakati, a beneficiary of the new technology says that due to tight cementing of the filaments, the yarn not only gains increased strength but the meterage also increases. He claims that one kg. of yarn yields 55

metres of warp of 0.82 metre breadth, as against 45 metres on Bhir. He has now engaged five handlooms for muga fabric production and is very much interested in the new technology.

Another area of improvement is cocoon drying. The pupa inside the muga cocoon should be killed within 4-5 weeks of its maturity. Generally, the cocoons are dried either in the sunshine or by small fibres under bamboo trays to kill the living pupa. But it is rather a time consuming process. CSTRI has recently introduced an electric dryer with 24 trays to overcome the problem. It can dry 36,000 cocoons in about two hours.

In fact the silk products of Sualkuchi could be adopted to the European markets simply by upgrading the technologies of reeling and weaving (Haxwell Lefroy, 1916). The introduction of filature type reeling and spinning machines

to the silk industry of Assam is expected to create interest among the local reelers and weavers towards better quality. Furthermore, introduction of semi-automatic handlooms and simple powerlooms for demonstration and on-the-spot training are also necessary to modernise the silk industry of Sualkuchi which is now weaving muga fabrics on 1000 and mulberry traditional cloths on 5000 handlooms.

Concerted efforts through extensive extension and motivational programmes to change the attitude of the people, adoption of available intermediate technologies including indoor rearing of muga, increased institutional financial assistance will help the silk industry of North-east usher a new era of development prosperity in 21st century.

**The author is retired Principal, Sualkuchi, Assam.**

**D**harmavaram, a pulsating weaving centre, has enthralled, endeared and throbbed the hearts of millions of women with its elegant, splendrous and classic silk sarees. Dharmavaram silks have carved out a niche of their own despite tough competition from its peers *Kanjeevaram*, *Pochampalli* and *Arani*. It would not be an exaggeration to say that Dharmavaram and Kanjeevaram are the cherished choice of the womenfolk of South India for adorning their wardrobes.

# Splendrous Silks

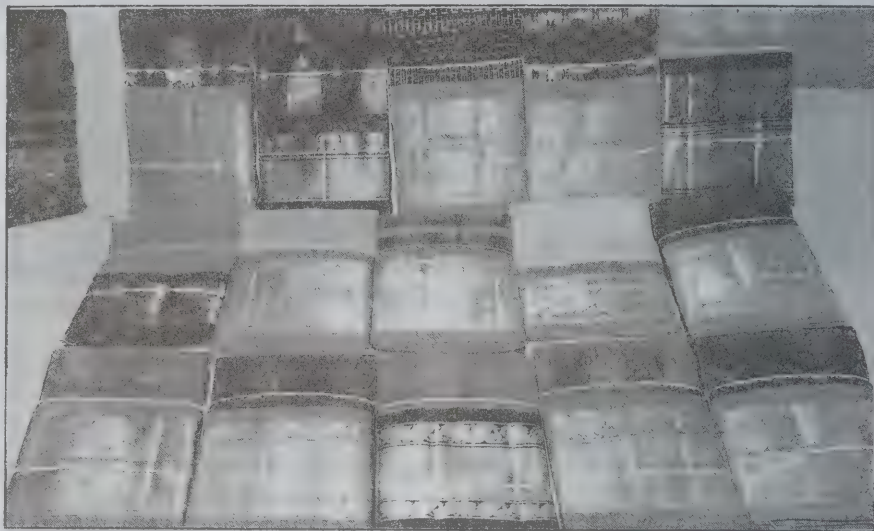
T.G.Rajappa

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***Dharmavaram silk has carved out a niche for itself in South India by rolling out sarees catering to all strata of people. The judicious blend of traditional and modern designs has added to the splendour of these sarees. Indian Silk is glad to bring out this special feature on Dharmavaram, an epicentre of weaving in Andhra Pradesh and a name to reckon with in the sphere of silk industry.***

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What is so special about Dharmavaram sarees or more specifically silks? One may infer to ask. The enthusiasm can be satiated in a terse and concise sentence that "Dharmavaram offers a saree for every section of the society". The judicious blend of tradition and modern designs



*Dharmavaram Sarees-Designs Galore*

coupled with salient features of light weight and pleasing colours has added to its splendour and charm. It has captured the minds of consumers, selling like a hot cake. Dharmavaram enjoys an added advantage with the middle and upper middle class emerging as a strong force with their more and more disposable income to spend on items like, sarees.

Dharmavaram, a haven of weavers, is situated just 40 km from Ananthpur district of Andhra Pradesh. According to historians, the town derived its name from *Dharmamba*-the mother of King Kriyashakti Odeyar, who constructed the Dharmavaram tank. It was one of the four villages rewarded by King Aliyara Maharaja to Shri Handle Hanumappa in 1573 as a token for his help in the struggle for power. Subsequently, it came under the rule of the Pakgar of Rayadurga and the

Golkonda dynasty. Dharmavaram was also under the governance of Hyder Ali and Tipu Sultan for some time, before it was captured by the British.

Silk is a way of life for the



*'Pavada' weaving*



# of Dharmavaram

T.V. Vathsala

Andhra Pradesh



people of Dharmavaram. As we criss-crossed the small town, the sound of umpteen number of handlooms greeted us. It was heartening to witness all family members chipping in their mite for making the end product, a thing of beauty and reality. The gutters are splashed with colour indicating the magnitude of dyers. We could easily deduce that the people are

ensconced in the business of making silk which is providing a decent livelihood to the majority of the people of this small town. Happiness is writ large on their faces as if proclaiming that poverty is unknown to them. What else can be a fitting tribute, although modest, to the Father of the Nation, Mahatma Gandhi, whose cherished dream was to wipe out the tears of poverty from every Indian's eyes!

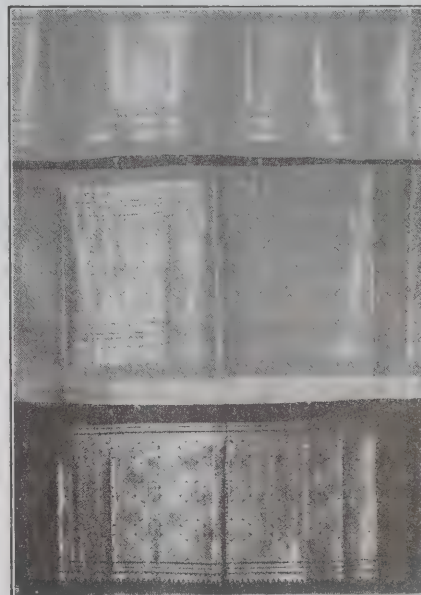
The Dharmavaram silk industry has traversed from its mere image of a production centre to that of a sizzling business area where producers and traders are vying with one another for meeting the ever growing and rapidly changing demands of the present day consumers, who are fashion conscious and at the same time, keeping a tag on the price.

## A weaving giant

Dharmavaram can be truly termed as a weaving giant, the magnitude of which can be gauged from the fact that as against a mere number of 400-500 looms during 1915-20 there are over 18,000 handlooms in the town alone, out of the 45,000 in the entire district of Ananthpur, today and the number is still surging. This implies about one-third of the town's population is engrossed in weaving activity. In other words, the sector provides livelihood to 9000 families or 36,000 people, as per a rough estimate.

The emergence of Dharmavaram as a vibrating silk weaving

centre is a recent origin. The silk route to Dharmavaram has its origin from Bangalore in Karnataka. Decades ago, Dharmavaram was a predominant cotton growing area and its cotton sarees were quite popular then. Later the ingenuity of weavers made them



'Gatti' borders

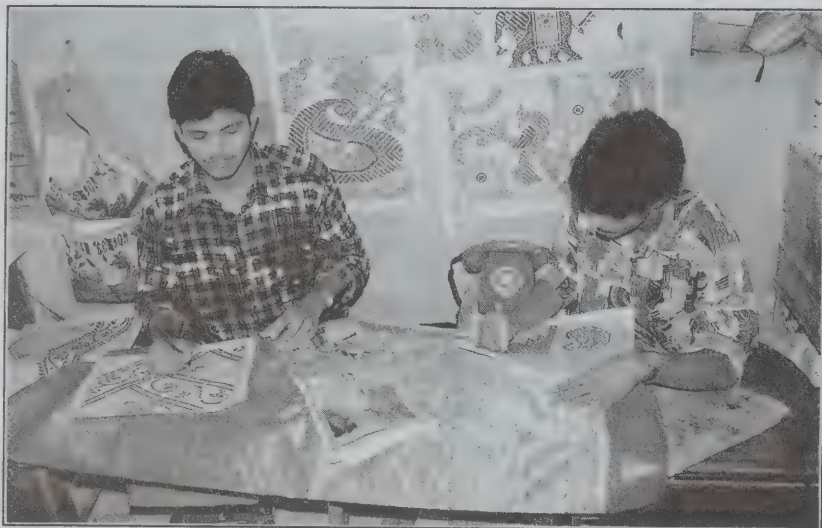
to come to Bangalore to buy hand-twisted silk yarn for blending it with cotton sarees. Thus, the silk made its way to Dharmavaram from Bangalore.

By and large, weaving in Dharmavaram was the exclusive domain of a few selected traditional communities. As time elapsed and by taking cues from the prosperity and thriving of the traditional weavers, other communities also adopted weaving to make both ends meet. The majority of the weavers hail from traditional communities like Sali, Padmasali, Thogata, Devanga etc.

Another discerning change in the silk industry of Dharmavaram is the gradual disruption of the link between the master weaver and the weavers. We could see many instances of weavers, setting up



## A Talented Designer



*Designing-Blending tradition with modernity*

Shri Govindaraju, popularly known as 'Designer Govindu' in Dharmavaram is a talented and promising zari designer. Aged 24, he is supported by his two younger brothers.

For Govindu, the art of design is a tradition and not by choice or chance. His father, Shri Purushotham, was a reputed designer and got an opportunity to observe the art right from his childhood. He started his career at the young age of seven.

Today Govindu is a popular designer known for his own creations. 'Niluvu Brocade', 'Small Cross Leaf', 'Sigma', 'Rangeela', 'Rainbow', 'Kalanjali', and 'Sa re ga ma' are some of his prominent designs. To avoid imitation, every design has a coded name.

The sculptures of Lepakshi temple, advertisements in newspapers/periodicals and electronic media besides his own intuition and ideas form the

source of inspiration.

A keen observer of market trends and fashions, Govindu is totally committed to quality. "Unless a design gives complete satisfaction to me, I will never release it to my customer", says Govindu. He conducts market surveys to keep abreast of the latest trends and fashions. He attracts 10-15 customers daily.

Govindu responds to the fast changing fashion trends of the present generation. He says that 'a designer should be ready to release newer and newer designs at short intervals as designs are time bound'.

Govindu is an active member of the Designers' Club of Central Silk Technological Research Institute, Bangalore and had undergone training in CAD. He is of the opinion that it is essential to get formal training from fashion institute like NIFT. He is also interested to go for CAD but its prohibitive investment acts as a hindrance.

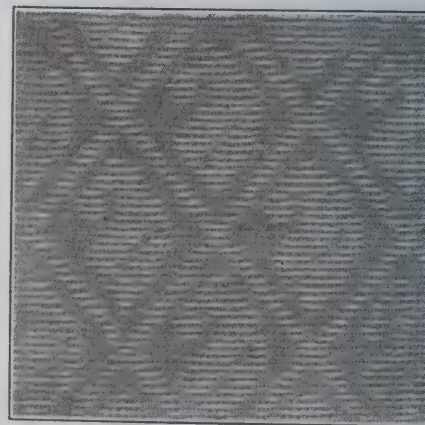
The weaving industry here also hinges on the cooperative concept. Way back in 1927, a primary co-operative society was

formed. In 1954, a Weavers' Co-operative Production and Sale Society under the aegis of Khadi & Village Industries came into being. Subsequently, Dharmavaram Silk Weavers Co-operative Production and Sales Centre was established in 1956.

The number of co-operative societies has mushroomed and today there are about 85 accredited societies in Dharmavaram alone.

To a probing mind, a walk through the important weavers colonies of Sivanagar, Gandhinagar, Kothapeta and Shantinagar is enough to get a first-hand knowledge of the inseparable link between the weaver and the loom. We were astonished to see that people irrespective of age, gender and time were totally engrossed in weaving.

The weavers mostly work on pit looms and the jacquard is becoming quite popular now. In earlier days, a weaver used to take a week's time to weave a saree with simple design. Thanks to the technical innovations, a present day weaver can finish the saree in two to two-and-a-half days, enhancing his earnings. His toil pays as a decent living can be made out of it. That is why the looms are omnipresent in Dharmavaram. They are accommodated in every conceivable place like verandah,



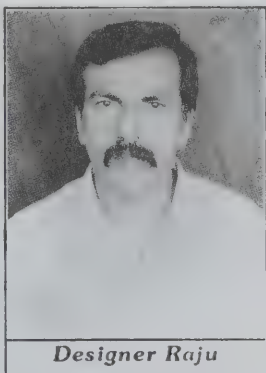
*A perfect geometry of a design*

their own ventures and becoming successful entrepreneurs and proud owners adorning the role of employers.



## A Beacon of Hope

In the age where every service is rendered for monetary consideration, Shri P. Rajendra Prasad (46), a reputed designer, better known as 'Designer Raju' stands out as a beacon of hope for selfless service to the needy. He has no hesitation to impart his artistic skills to others as long as it sustains a livelihood.



Designer Raju

Raju's establishment reminds us of an ancient 'Gurukula' where a group of students squat on the ground making sketches and drawings. A student with an artistic bend of mind and dent of hard work can acquaint with the art within two years.

The profession of design was not in the heredity of Raju, although his family is associated with silk. After completing matriculation in 1969, he had undergone a training in weaving, handlooms and designing under the guidance of a guru who was well-versed in jacquard weaving techniques. After working as a clerk from 1970-79, he re-entered into the silk field as a designer and opened a shop of his own.

Raju's artistic skills have sharpened and blossomed over a period

of time. 'Artistic inspiration comes from within' he says and adds that, 'experience and one's own creative ability also count. Raju works on different permutations and combinations of an object and carves out his own creation. 'Kalakshetra' created by him in 1979 is his most popular design.

Raju is well aware of the rapid commercialization pervading the silk industry and technological strides. He advocates that designers should also swim with the mainstream and get acquainted with the latest technology to keep pace with the time, age and fast changing taste of the consumers.

"A designer's motto is only customer's satisfaction and he has no personal say in it because of which quality obviously suffers. Yet such things are overlooked with the recent concentration on more production, low cost and high margin. A designer cannot forget that he is the creator of a masterpiece. But still he cannot swim against the current. Only time can tell when the trend can be reversed", Raju ruminates hopefully.

hall, room and at times, even in kitchen.

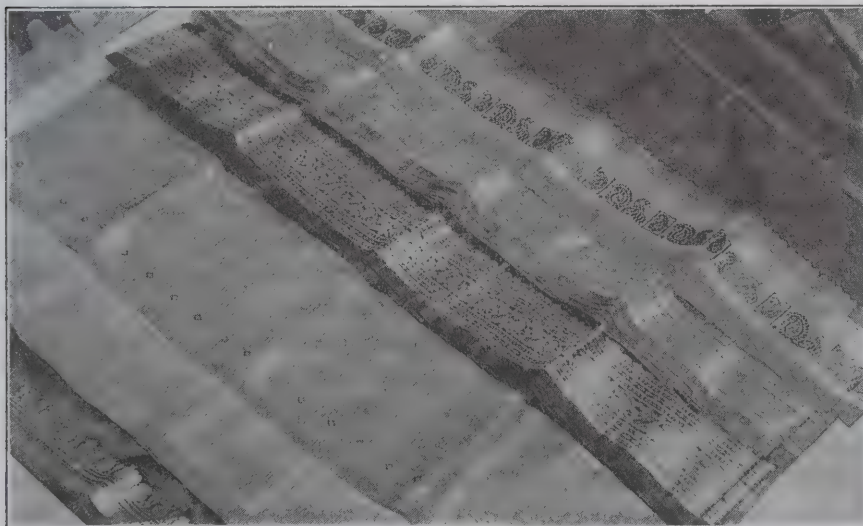
The Dharmavaram weavers generally practice solid border and body technique. An estimate shows the annual production of silk sarees in Ananthpur district at 27 lakh numbers generating a trade of Rs.400 crore with Dharmavaram chipping in with 80%.

### Salient features - Hallmarks

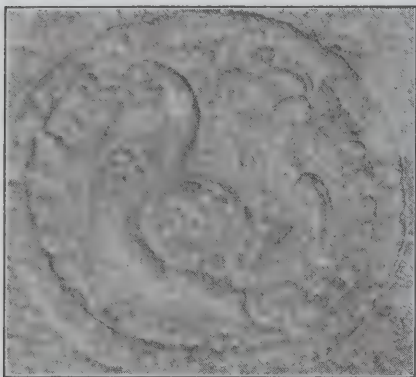
Mainly two types of sarees are woven in Dharmavaram. *Kuttu* sarees with contrast borders and pallu with entire weft having only one colour. The process is very slow because it involves stitching. The other is *Lattu* sarees with self borders and pallu, the process of which is very fast and in line with the latest trend and fashion.

The hallmarks of Dharmavaram sarees are the motifs and designs adapted from the sculptures of temples at Lepakshi and Tadapatri and other motifs of nature like peacock, deer, flowers etc. The culture and tradition of Andhra Pradesh has also been woven into the saree.

Dharmavaram sarees are light in weight with broad heavy zari borders ranging from 6 to 12 inch, known as *Gatti anchu* or solid borders. Earlier, pallu and border were stitched to the main body of the saree. Later, star, diamond and flower shaped *buttas* appeared. These features help in identification of Dharmavaram sarees. But recent designs tend to resemble Kanjeevaram sarees making it difficult for a layman to identify Dharmavaram and Kanjeevaram sarees. *Buguda* border sarees also command a good demand. Fast moving colours are lux, parrot, olive green, rani or magenta, peacock blue and mustard. The weavers generally use two types of yarns, Charkha (4 ends) yarn of good quality and the other is Doubling yarn.



Borders that border the elegance



**Temple sculptures-the greatest inspiration**

### Saree specifications

A few varieties of Dharmavaram silk sarees are as follows:

- \* Single sided contrast zari border of 1/4 inch and 2 lines, plain body, 6 line zari border in the pallu
- \* Korvai design with 2-3 inch of zari woven double sided border, zari butta in the body and zari border woven 20-26 inch rich pallu
- \* Two to four inch one sided border, body with small zari buttas and contrast zari pallu
- \* Six inch big solid zari border, simple zari butta on the body, rich and solid designed zari pallu
- \* Three inch double sided zari border with cross zari butta on the body and 26-36 inch rich zari pallu.
- \* Three inch double sided jacquard border, cross buttas all over the body and jacquard self designed zari butta.
- \* Three inch double sided jacquard woven zari border, zari checks and buttas on the body and rich zari woven pallu.

The cost of Dharmavaram silk sarees ranges from Rs.850-8500, the average being Rs.1500. The rate varies based on the weight of silk and intricacy of the weave and design. The more the work on body butta, pallu and border designs, the more expensive will be

the saree. "Pavadas" of Dharmavaram are also enjoying a premium market.

The spurt in demand for Dharmavaram sarees has given a new dimension to the silk industry of this town. The weavers of Rayalaseema region (Ananthpur, Chittoor, Karnool and Cuddapah districts) are also thronging the Dharmavaram market for selling their products.

'Dharmavaram sarees sell like hot cake', avers Shri P. Mathiazghan, Senior Research Officer, Silk Conditioning and Testing House, Dharmavaram, which is rendering necessary guidance and help to the local silk industry.

Dharmavaram sarees are in great demand in whole of South India, Tamil Nadu being the major market.



**Pallem Srinivasulu**

### A Patriarch Reminiscences

*Pallem Srinivasulu, a master weaver, who has been in the business of silk for over 70 years, has witnessed the traverse of Dharmavaram silk industry from its inception to the present day status. The octogenarian is a living legend who is also a veteran freedom fighter.*

*Pallem recalls the link between the master weaver and the weavers in olden days. Stepping into the shoes of his father, who was also a master weaver, Pallem began his destiny with silk as a master weaver at the age of 13. He used to supply twisted and dyed yarns to weavers for making sarees. He vividly remembers that the cost of raw silk, twisting and weaving was nominal and he used to keep about 150 looms busy always. Gradually, the link between the master weaver and the weavers snapped paving way for the weavers becoming loom owners, successful entrepreneurs and employers.*

*Pallem proudly says that eco-concept in dyeing was practised by him at that time to some extent. He used 'Kiragunji' and 'Kapela' seeds for red and yellow. Now he gets the yarns dyed outside, but dissatisfied with quality of dyeing.*

*'Rudrakshipetu' and 'Vankipetu' were the popular designs in those days, recalls Pallem. A weaver used to take 8-10 days for completing a saree due to the slow and laborious process of weaving pallu and border separately and stitching to the body of the saree. 'Adi' sarees of 9 yards were also woven with intricate designs exclusively for brides. There were also cotton sarees with silk borders known as 'Kundamnadu anchu' and 'aaru kundala anchu' exclusively used by the villagers on the occasion of wedding.*

*Pallem is peeved at the deteriorating quality of Dharmavaram silk. A staunch believer in maintaining quality, he affirms that in bygone days people used to wear sarees bought from his shop for a minimum period of 20 years. Even now when the quality of raw silk is not good, his sarees can be worn for a minimum period of 12 years. Pallem has passed on his legacy to his two sons. At present, they are having 30 looms and producing 150 sarees per month. Pallem reiterates that 'we are the pillars of maintaining the prestige of Dharmavaram silk. We mean quality and we still stand for it'.*



## Pedalled to success



*The dyers paradise*

Starting off as a petty dyer going on a bicycle from house to house collecting yarns for dyeing, Shri K. Chenna Reddy today is one of the leading dyers of Dharmavaram. His success is truly a 'rag-to-riches' story.

Shri Reddy, aged 36, left his native place when he was 16 years after having a tiff with his relatives for land. He came in search of a livelihood. All was not well with Reddy initially. He was forced to work as a labourer in a dye shop for 10 years.

Later, he started a petty shop of his own doing 'sample dyeing' (dyeing only the undyed portion) on piecemeal basis collecting yarns from houses on a bicycle. Gradually he expanded his activities from sample dyer to that of a dyer. Initially he used to dye 4-5 kg. of yarn per day.

Presently, Shri Reddy is an established dyer and undertakes dyeing on a large scale between 40-60 kg. of yarn per day. Mondays and Tuesdays, it even ranges from 100-140 kg. His younger brothers are actively helping him. A person who came in search of a livelihood is now a provider of bread and butter to seven workers.

## A major dyeing centre

Dharmavaram is the major dyeing centre in Andhra Pradesh. There are 23 big recognised dyeing units besides 120 dyers who dye only the *Kongu* or the *Pallu*. It is a common sight that dyed yarns are hung in front of houses giving a splash of colours to the eyes.

On an average, a dyer dyes 40-50 kg. of yarn per day and on Mondays and Tuesdays, the work load will be more. One may dye

double the normal quantity on these days. The cost of dyeing varies from Rs.70-100 per kg. of yarn, depending on the colour used.

While a few colours like parrot green, lux green, red and mustard cost more, dyes like off white, cream, tasar, gold, etc. cost less. The dye stuffs are sourced from Adoni, Tadapatri and Bangalore.

Besides established dyers, there are petty road side shops which undertake dyeing on piecemeal basis and prospering.

## Designing

There are very few reputed designers in Dharmavaram as compared to the magnitude of weaving and dyeing sectors. Yet, these handful designers are dexterous enough to keep pace with the fast changing fashion market of the present time.

A designer's role is not cut out. Instead, he has to keep abreast of the latest trend and fashion, and even sometimes, predict the fashion with his intuitive ideas and experience. The designers have lived upto this expectation as is evident from the booming demand for Dharmavaram sarees.

As discussed, Dharmavaram sarees, which were identified with their traditional designs till recently, have been able to capture the minds of the people by imparting



*Compatible combinations*

a deft and judicious blend of tradition and modern designs.

The present design market is constantly changing. Unlike earlier days, a particular design may not find favour with the consumers even for three months. The designers of Dharmavaram are inclined to absorb the consumer preferences to equip the





*A wayside dyer*

industry to meet the challenges from other weaving enclaves. Though advanced technologies like CAD have not made inroads due to high investment, yet they are willing to adopt them provided it is economical, which may help in furthering their creativity.

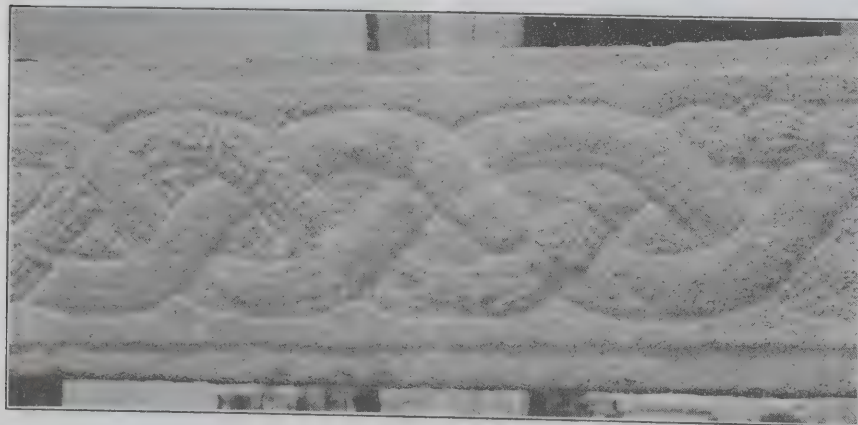
#### **Auxiliary units**

The mainstream sectors are fairly supported by subsidiary services like card punching, hand stentering/polishing and darning units. The card punching units supply design cards punched according to the loom requirements. Darning units give new shape to a damaged saree. Hand stentering assists in removal of creases and stains from sarees. Zari polishing units undertake the task of giving

a glittering look to the sarees which have lost their zari brightness owing to gestation period involved in selling of a particular type of sarees. There are also some people making a livelihood out of *Jala* by reeling the unreeled portion of the reeled cocoons braving the stench of the decomposed pupae.

#### **Pre-cocoon sector**

Dharmavaram is more a weaving centre and pre-cocoon scenario was rather sluggish till a few years ago. Of late, attempts have been made to give a fillip to sericulture also. As a result, today, the area under mulberry has gone upto 3144 acre producing over 18 lakh kg of cross breed and multivoltine cocoons.



*Taking a cue from temple designs!*

#### **A Dazzling Success**

'Navyakala silks' a brain child of Shri V.V. Raman, a master weaver has been attracting traders from Andhra Pradesh, Tamil Nadu and Karnataka, especially for its fancy sarees. In a short period of 6-7 years of existence, 'Navyakala' has become a name to reckon with.

Born into the family of a master weaver, Raman was trained to wind zari and weave buttas from the early age of six years. The common types of sarees sold are 6 yards with 10", 8" and 6" solid borders and price ranges from Rs. 2100-3200. These sarees are mainly used on the occasion of marriages. The rate of fancy sarees with intricate designs ranges from Rs.6000-8000.

Raman's wife is also a weaver who runs 'Ravitheja Silk Weavers' Co-operative Society', an all-women weavers' society. This society helps its members to get orders and sell their products ensuring a reasonable return.

The reeling sector is not very active in Dharmavaram. There are only 45 reeling units which are inadequate considering the size of weaving and dyeing sectors.

Shri P. Venkataramaiah, Assistant General Manager, SERIFED, Dharmavaram says that 'against the requirement of 50 ton of yarn per month, nearly 30 ton is coming from Karnataka. Unlike in Karnataka, the reelers in Andhra Pradesh are not statutorily obliged to route their yarns through Silk Exchange.

The insufficient reeling capacity has affected the Dharmavaram cocoon market too. Although it is



## Success Comes the Hard Way

For Shri V.Chalapathi, the hopping from a worker in a twisting unit to a successful entrepreneur was not a bed of roses. It was his dent of hard work, determination and inclination to adopt new technologies that have catapulted him to a successful reeler and owner of 'Kulai Sami Silk Industries' in Dharmavaram.

He started a small twisting unit followed by charkha and filature. He was forced to close down the filature unit since there was no market for it in Andhra Pradesh. He re-opened the unit with the help of Central Silk Board which has also installed a multi-end reeling machine at his premises recently.

Chalapathi is now an enterprising entrepreneur who undertakes reeling on a large scale on charkha, filature and multi-end. He employs 20 labourers in the reeling and 10 in the twisting units. On an average,



Chalapathi in his unit

he produces 70 kg of silk yarn and 100 kg of twisted yarn, a month

Chalapathi feels that quality yarn can be produced from multivoltine cocoons through multi-end reeling machine. The machine has got jet bout system with wide water basin which helps in maintaining colour uniformity of yarn besides stainfree. 'Unifor-

mity and quality of yarns cannot be maintained in charkha or cottage basin', he states. However, he feels that the main hindrance in installing multi-end is the non-availability of quality cocoons and the cost factor.

Chalapathi keeps a track of the latest technologies especially in the field of reeling and makes optimum use of them. It is the secret behind his success. He frequents the Silk Conditioning & Testing House, Dharmavaram for this purpose.

'A beginner should observe and learn the work and later do it practically' advises Chalapathi. One should also select skilled labourers and have concern for their welfare. He has provided free accommodation and electricity to his workers. 'To be successful in the business, one should use quality cocoons, be a keen observer of market trends and sell the product at the right time and price, Chalapathi puts in a nutshell.

the second biggest cocoon market in Andhra Pradesh (first being Hindupur), the buyers mainly from Karnataka are purchasing the bulk of cocoons.

Shri Krishna Reddy, Assistant Director, Directorate of Sericulture, Dharmavaram, Andhra Pradesh says that, 'cocoon production is sufficient but reeling capacity has to be improved'.

### Grey areas

It has been gathered from the weavers that Dharmavaram sarees are sold as Kanjeevaram through unfair trade practices. It is very difficult for a layman to identify Dharmavaram and Kanjeevaram sarees because of their 'look alike', difference being mostly in the content of pure zari. As long as the



Nature-A rich source of designs

weavers finding a sure market for their products, they do not mind this practice.

A plausible solution to this exploitation of weavers perhaps lies in the introduction of a 'Sys-

tem of Certification' for Dharmavaram sarees.

Shri Pallem Srinivasalu, a master weaver of yester years, feels that 'the quality of  
(Contd. on page 46)

## Field Day on Tasar Culture



**Shri Jayesh Ranjan, IAS, Project Officer, Integrated Tribal Development Agency, Rampachodavaram addressing the rearers**

To commemorate the Golden Jubilee celebrations of independence, the Regional Tasar Research Station, Warangal, Andhra Pradesh organised a Field day on December 4, 1997 at Rampachodavaram, East Godavari district. The objective of the programme was to expose tribal tasar rearers to the latest technologies for economic improvement through tasar culture.

Shri Jayesh Ranjan, IAS, Project Officer, Integrated Tribal Development Agency, Rampachodavaram presided over the function and Shri Burra Venkatesham, IAS, Sub Collector, Rampachodavaram was the chief guest.

The Project Officer advised the farmers to adopt the new technologies. He informed that 150 acres were covered under maddi (*T. arjuna*) plantation during 1996-97 and proposed to extend further. He said that tasar dfls. are supplied free of cost to the rearers and marketing was arranged by inviting traders from Madhya Pradesh and Bihar to ensure remunerative price.

The Sub Collector felt that field days play vital role in propagating technology through demonstration. He termed tasar culture as more income generating avocation. He suggested to take up tasar plantation in Podu and Banjar lands for which necessary assistance would be extended. He also congratulated the progressive tribal tasar rearer, Shri Kathula China Ramachandra Reddy (Konda - Reddy), who got Rs. 25,000 through tasar silk-worm rearing.

Later, Dr. P. Jaya prakash, SRO, RTRS, Warangal conducted demonstration on new rearing technologies and also explained the prophylactic measures to be taken during silkworm rearing.

Shri Rama Rao Majumdar, Asst. Director, BSM&TC, Rampachodavaram conducted the interaction session. More than 100 members including 71 tribal rearers, DOS officials, ITDA and scientists from RTRS, BSM&TC, Rampachodavaram, participated.

**Report : P. Jaya Prakash, SRO, RTRS, Warangal, A.P.**

## Netherlands Contemplates Stronger Controls on Azo Dyes

The Netherlands government will consider imposing more stringent measures to control carcinogenic azo dyes, if research proves that public health is at risk.

A report presented to the Minister for Environment on 'Occurrence of Carcinogenic Azo dyes in the Netherlands' and defining carcinogenic azo dyes as a group which, under certain circumstances may split off in one or two carcinogenic amines, classified 22 such amines. Carcinogenic azo dyes have been found in products traded on the Netherlands market such as carpets, diapers, furniture fabrics, etc.

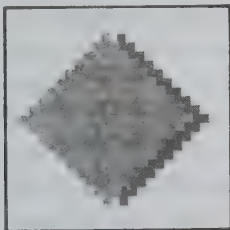
The Netherlands National Institute of Public Health & Environment will investigate the cancer risks of azo dyes in products sold in the Netherlands and will also examine their presence in cosmetics, ink, leather goods, plastic and textiles.

If needed, additional measures could be taken in the framework of the Netherlands Commodities Act. In any case, the government will consult other EU members about possible plans to extend the legislation.

An English translation of the report 'Occurrence of Carcinogenic Azo Dyes in the Environment' is available from the Environment Ministry's Directorate of Radiation, Safety and Substances, P.O.Box 30945, 2500 GX, Hague, The Netherlands (Contact Person - Jasper Groos).

(Source : Silknet)





## Soft Furnishing Asia '98

'Soft Furnishing Asia '98' – a splendid and original display of the latest designs and trends in soft furnishing products and services around the world will be organised at Singapore International Convention and Exhibition Centre from 14-16th

May, 1998. Making its debut in Singapore, over 100 companies worldwide will be participating in the event, which promises to be the ideal platform for exhibitors to build corporate awareness, reinforce brand loyalty and have an access to the burgeoning Asia-Pacific furnishing market.

The product profile includes furnishing fabrics, curtains, drapery and accessories, carpets and rugs, etc. The event enjoys full support from the Singapore Institute of Architects, the Singapore Interior Designers' Association and the Renovation and Decoration Advisory Centre. All information pertaining to the event is also available on the web page. For more details, contact :

Ms. Theresa Gan/Ms. Christine Fan

Soft Furnishing Asia '98, Events Production Department,  
Singapore International Convention & Exhibition Centre,  
1 Raffles Boulevard, Suntec City,  
Singapore-039 593.

Tel : (65) 431 2263/2292, Fax : (65) 431 2268,

Internet : <http://www.sicec.com>, e-Mail : [Sales@sicec.com](mailto:Sales@sicec.com).

## Quality Dupion Silk

A special high quality silk dupion fabric, conforming to the international standards and suitable for export, has been developed by the Federation of Sericulturists and Silk Weavers' Co-operative Societies Ltd. (SERIFED) under the control of the Commissioner of Sericulture, Govt. of Andhra Pradesh.

The dupion gives better sheen than Chinese yarn and by a special process the slubs are minimised and a soft finish is given to the fabric. Shrinkage of 2%, colour fastness to wash at 4 against 5, Azo-free dyes and timely delivery are guaranteed. Serifed will be able to undertake orders of one lakh meters per month. Because of its special features, the fabric is well received by several exporters.

*For more details, contact*  
The General Manager  
SERIFED

6th Floor, Samrat Complex  
Saifabad, Hyderabad-500 004  
Grams : SERIFED  
Tel : 040-599915  
Fax : 040-234732

## Field Day in Bhadoi



*Field Day in progress*

'Bhadoi' – rechristened as Sant Ravidas Nagar – is a district of international repute for its exports of carpet worth Rs. 2000 crore every year. The district comes under the ambit of the Purvanchal

Sericulture Development Project (PSDP), Varanasi, Uttar Pradesh.

A Field Day was organised by PSDP at Duduba-Dharampur village in Bhadoi district on December 8, 1997, with a stress on the

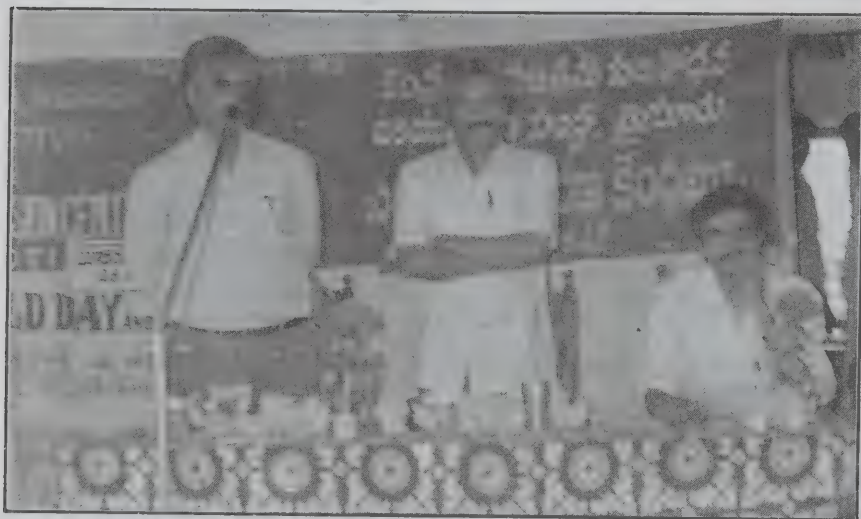
importance of local production of raw silk for manufacturing carpets and sarees.

The programme included a film show on sericulture, demonstration of raising mulberry nursery and economic plantation. Shri Chandra Bhan Singh, a local progressive farmer, shared his experience and appealed to the villagers to take up sericulture for economic advancement. Over hundred farmers from surrounding villages participated in programme.

**Report : S.B. Saraswat, Deputy Director, PSDP, Varanasi, U.P.**



## Bivoltine for Higher Returns



*Scientists explaining the new technologies*

A Field Day for popularising the advantages of bivoltine was organised by the Research Extension Centre (REC), Rayachoti at Budidaguntapalle village in Rayachoti district of Andhra Pradesh on November 26, 1997.

The field day's star attraction was Shri D. Raja Reddy, a progressive farmer, who had reared 200 dfls. of bivoltine pure (NB<sub>4</sub>D<sub>2</sub>)

in his one acre mulberry garden and harvested 123 kg of cocoons fetching a return of Rs. 31000 which is the highest in the district so far.

Shri Reddy, a bivoltine rearer motivated by the REC, has adopted the new technologies wholeheartedly and put in unstinted efforts on all aspects of mulberry cultivation and silkworm rearing.

All this helped him to achieve the encouraging result which is worthy of emulation by other sericulturists. His achievement has proved that the area, which was hitherto considered not suitable for bivoltine, holds out a good prospect for bivoltine.

The programme's motto was to motivate other farmers to take to bivoltine by adopting cues from Shri Reddy's achievement. The field day comprised a visit to mulberry garden, rearing house and exchange of views with the model farmer. An exhibition on new technologies was also arranged on the occasion. Shri. K. Chennakrishnappa, Assistant Director, DOS, Shri M.R. Subbu Swamy, SRO, RSRS, Anantpur, Dr. M.P. Reddy and Dr. G.V. Prasad, SRAs explained the merits of bivoltine and package of new technologies for the benefit of the participants consisting of 45 farmers and officials from CSB and DOS.

**Report : G.V. Prasad, SRA, CSR&TI, CSB, Rayachoti, A.P.**

## Muga Krishimela

Regional Muga Research Station, Central Silk Board, Boko, Assam has organised a Muga Krishimela at Tezpur on 16th December, 1997 in commemoration of golden jubilee of independence. About 200 muga farmers from different parts of Assam and district authorities attended the function.

Shri Ramendra Narayan Kalita, Hon'ble Minister of Sericulture, Handloom and Textiles, Govt. of Assam inaugurated the Krishimela and exhibition. He emphasised that there should be close liaison between Department of Sericulture and CSB in implementing the developmental activities and establish linkage with rearers and reelers.

He said that CSB alongwith State officials of sericulture of North-eastern States has prepared an integrated project on muga and eri with a financial outlay of about Rs. 96 crore for implementation during IX plan. He pointed out that the establishment of Central Muga Research and Training Institute at Ladoigarh will cater the long felt need of intensive research in muga. He expressed hope that CSB will take adequate steps for completion of the project in time. Highlighting about the development of muga culture in Sonitpur district he desired that more and more land will be brought under muga host plantation for solving the problem of muga seed require-

ment. Necessary infrastructural facilities like P<sub>2</sub> farm/grainage etc. will be created at suitable locations in the district.

Shri Birndaban Goswami, MLA, Tezpur graced the function as guest of honour and requested all the departments to come together to venture some land based composite culture to optimise the utilization of land for maximum income generation. He informed that many women societies are involved in muga rearing at Borsala, sharing plantation of the VGR. They reel and weave muga fabric for their livelihood.

Presiding over the function, Shri Tapan Mandal, IAS, Director (NE), CSB, Guwahati emphasised



that appropriate R&D support for varietal improvement of host plant, evolution of high yielding muga race and adequate extension programme need to be carried out with product diversification to enter into global market.

Shri H. Rabha, Additional Director of Sericulture, Govt. of Assam informed that coming years will be boon for muga/eri culturists of Assam as several sustainable schemes have been considered for implementation. Shri P.K.Das, Joint Director, RMRS, Boko welcoming the participants and the dignitaries said that purpose of organising the muga krishimela will be successful in bringing planners, technologists and beneficiaries closer to identify areas of thrust and to help percolate research finding.

Shri A.A.Sarmah, ADS(Dev.) Sonitpur District, Shri A Tamuli, ADS, Sericulture, Sonitpur and Dr. R.S.Teotia, SRO, RMRS, Boko also spoke on the theme.

Shri B. Choudhury, SRO, RMRS, Boko presented a comprehensive paper on improved methodologies of muga culture and income generation potentialities. The farmers said that the muga host plants raised under AMFP scheme has achieved a definite milestone in development of muga culture by reducing the gestation period and improving productivity.

**Report: P.K. Das, Joint Director, RMRS, Boko**

## Imports & Exports Public Notice

Reproduced below is the Imports & Exports Public Notice Notification No. 19/1997-2002 dated 22nd October, 1997 for the benefit of exporters.

In exercise of powers conferred by section 5 of the Foreign Trade (Development and Regulation) Act, 1992 (No. 22 of 1992) read with paragraph 1.3 of the Export and Import Policy, 1997-2002 published in the Gazette of India extraordinary, Part-II-Section-3 Sub-section (ii) vide S.O. No. 283(E) dated 31-3-1997, the Central Government hereby makes following amendments in the Export and Import Policy, 1997-2002 :

"The level of export

performance for the purpose of recognition as given in paragraph 12.13 and introduced by Notification No. 6/1997-2002 dated 9th June, 1997 shall be amended to read as follows :

Transitional arrangement for recognition for the period 1997-98 and 1998-99.

12.13 An exporter has an option to get recognition for the period of one year 1997-98 and for the year 1998-99 based upon the level of export performance as given in this paragraph.

The provisions of paragraph 12.7 shall be applicable to exporters seeking recognition under this paragraph.

Category	FOB criterion (Value in Rupees-crore)		NFE criterion	
	Average FOB value of exports made during the preceding three licensing years	FOB value of exports made during the preceding licensing year	Average net foreign exchange value of exports made during the preceding three licensing years	Net foreign exchange value of exports made during the preceding licensing year
<b>For 1997-98</b>				
Export houses	10	15	8	12
Trading house	50	75	40	60
Star trading house	250	375	200	300
Super star Trading house	750	1125	600	900
<b>For 1998-99</b>				
Export house	15	22.50	12	18
Trading house	75	112.5	60	90
Star trading house	375	562.5	300	450
Super star trading house	1125	1687.5	900	1350

(Source: Silknet)

## BETA '98 Trade Fair

The BETA International Trade Fair, 1998 will be held at the National Exhibition Centre, Birmingham from February 22-24, 1998, unveiling a brighter look at the country clothing and fashion area.

A major feature of the event will

be the Fashion Show, taking place three times daily, which will provide an exciting and dynamic look at the latest equestrian and country styles. A designated area will include major country leisure wear exhibitors and will preview the latest designs to be

available next season.

The country fashion at BETA is an extremely important forum for national and international business. Over 2,700 companies visited the BETA Trade FAir, 1997, totaling 5,630 people from 40 countries.

## Field Day on Tasar Culture at Khadembeda



*Farmers visiting chawki garden tasar silkworm rearing*

As a part of golden jubilee celebrations of India's independence, a Field Day was organised at Demonstration Centre,

Khadembeda under Besoi Tasar Rearers Co-operative Society (TRCS) on October 28, 1997 by Research Extension Centre,

Bangriposi, Orissa. A technology demonstration on chawki garden rearing was given by Shri Shantakar Giri. Shri S.K. Swain explained the package of practices disease control while others discussed tasar df. transportation basket, pre-hatching care and charka reeling. It was followed by an inter-action session in which the farmers and state officials exchanged their views on various aspects of tasar culture. Fortyfive tribal farmers, state officials and President, Secretary of TRCSs attended the programme.

**Report : M.O. Alam, Assistant Director, Research Extension Centre, Bangriposi.**

## ECO-TESTING LABORATORY

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**Deputy Director,  
ECO-TESTING LABORATORY,  
CENTRAL SILK TECHNOLOGICAL RESEARCH INSTITUTE,  
Central Silk Board,  
(Ministry of Textiles – Govt. of India)  
B.T.M. Layout, Hosur Road, BANGALORE – 560 068  
Ph : 6687808, 6689152 Fax : 6680435**



# Textile Trade Fairs – 1998

Date	Exhibition	Place
1998 Mar 26-29	<b>INDIA</b> <b>GARTEX '98</b> Garment Machinery, Textiles & Accessories Venue : Pragati Maidan Contact : Modern Multi Media Marketing Co. (India) Pvt. Ltd. Ph : 5704450/4234 Fax: 091-011-5700644/2138	New Delhi
May 29-01	<b>ACC-MA-TEX-II</b> Garment Accessories, Machineries and Textiles (Hosiery and Textile Fabrics) Venue : Netaji Indoor Stadium Contact : Freeman Graphics & Designs Pvt. Ltd. Ph : 6607219/7441 Fax: 091-033-6607441/1803	Calcutta
1998 Mar 02-04	<b>OVERSEAS</b> <b>MODA IN</b> Textiles and Accessories Contact : Fiera de Milano 20126 Milano Ph : 6610820 Fax : 39-2-66103844	Milan Italy
03-06	<b>POZNAN FASHION WEEK</b> Contact : Poznan International Fair Ph : 692592 Fax : 48-61-665827	Poznan Poland
06-09	<b>PREMIERE VISION</b> Clothing Textiles Venue : Paris-Nord/Villepinte Contact : Premiere Vision Le Britannia "A" Ph : 7860655 Fax: 33-1-7266508	Paris France
10-12	<b>TEXTILE '98</b> Manufacturing Technology Contact : Benjamin Dent International Ltd., Leicester LE1 7GA Ph : 2548271 Fax: 44-116-2470194	Manchester U.K.
11-14	<b>SAMAB</b> Clothing Industry Machinery and Accessory Venue : Hall 10, 11, 12, Fiera Milano Contact : Ente Fieristico SAMAB 27-20124, Milano Ph : 6690677 Fax : 039-02-6691174	Milano Italy

Date	Exhibition	Place
15-18	<b>INTERNATIONAL KIDS FASHION</b> Childrenswear, Apparel, Accessories Footwear and Juvenile Products Fall – Back-to-school Venue : Javit Convention Centre Contact : The Larkin Group, New York NY 10018 Ph : 5940880 Fax : 1-212-5948556	New York U.S.A.
17-20	<b>VIETNAM TEXTILE AND GARMENT INDUSTRY EXPO '98</b> Contact : CP Exhibition Wanchai Ph : 25117427 Fax: 852-25119692	Hanoi Vietnam
17-20	<b>VIETNAM FABRIC &amp; GARMENT ACCESSORIES EXPO '98</b> Textile and Garment Venue : Vietxo Cultural Palace Contact : CP Exhibition Wanchai Ph : 25117427 Fax: 852-25119692	Hanoi Vietnam
21-24	<b>INTERNATIONAL FASHION BOUTIQUE</b> Womens Apparel, Accessories and Jewellery, Immediate – Early Fall Venue : Javit Convention Centre Contact : The Larkin Group New York, NY 10018 Ph : 5940880 Fax: 1-212-5948556	New York U.S.A.
24-26	<b>DESSOUS CHINA</b> Lingerie Contact : Igedo International Modemesse, D-40468 Dusseldorf Ph : 439601 Fax: 49-211-4396373	Shanghai China
24-26	<b>TCF INTERNATIONAL</b> Clothing, Footwear and Fashion Accessory Venue : Darling Harbour Contact : Australia Exhibition Services Pty. Ltd., Melbourne, Victoria 3004 Ph : 92614500 Fax: 61-3-92614545	Sydney Australia
24-27	<b>HANOI TEXTILE AND GARMENT MACHINERY EXPO</b> Contact : CP Exhibition Wanchai Ph : 25117427 Fax: 852-25119692	Hanoi Vietnam

# Trade Enquiries

Sl. No.	Importers	Interested in
1.	Gablonzer Genossenschaft mbH P.O. Box 5, Steyrerestr. 18 4470 Enns, Austria Fax : +43-7223-8323613/32	Silk Scarves, Silk Underwear Silk Nightgowns
2.	M/s. Tays Private Limited, P.O. Box 17947, Addis Ababa (Ethiopia) Tel : 00251-1-517733 Fax : 00251-1-517304	Textile
3.	M/s. Boutique Sleep Comfort P.O. Box 175350 Beirut (Lebanon) Fax : 961-1-585831	Silk
4.	Line Design Avenue du Capricorne, 17 1410 - Waterloo Tel : 02-354 7570 Fax : 02-354 7570	Silk Cushion Covers
5.	DA Vinci Computerised Labels Pvt Ltd 167/76 Orugodawatte Trade Complex Avisawela Road, Orugodawatta Tel : 572881 Fax : 572442	Warping machines, yarn dying, machines, colour matching system and yarp yarn
6.	Anglo-Eastern Co Ltd 24-1/2, Albert Crescent Colombo 7 Tel : 696662 Fax : 696662	Textile machinery and spare parts
7.	Industrial & Comm. Dev. Corpn. P.O. Box 61092, Nairobi Kenya Tel : 229213 Fax : 333880	Yarn processing Equip.
8.	Puja Creations P.O. Box 46456, Nairobi Tel : 339109 Fax : 340948	Lingeries/Ladies Nightwear
9.	Mrs C R Wood P.O. Box 24490, Nairobi Tel : 882847 Fax : 882501	Ladies Readymade Garments
10.	Nobrexport-Comercio de Import/Export. lda R. Central dos Cavados, 5 4465 S. Mamede de Infesta Matosinhos, Lisbon, Portugal Tel : 351 2 9015689 Fax : 351 2 9015934	Textiles



# तसर पौधों में तना भेदक की प्रकृति एवं विस्तार

के. जयपाल रेड्डी, जी. मास्ती राम, जी.एस. यादव एवं बी.आर.आर.पी. सिन्हा

**त**ना भेदक स्फेनोप्टेरा क्यूप्रीवेन्ट्रीस केर के लार्वा एवं वयस्क दोनों ही तसर रेशमकीट के प्राथमिक पौधों अर्जुन एवं असन को अत्यंत अधिक क्षति पहुँचाते हैं जिसमें वयस्क की अपेक्षा लार्वा का हिस्सा अधिक होता है। पीड़क जीव के वयस्क, पौधे की पत्तियों एवं छोटी-छोटी शाखाओं पर कुतरते हुए पोषण प्राप्त करते हैं। इस नाशक जीव से असन एवं अर्जुन के पौधे के पर्ण छतरी क्षेत्र के व्यास में 1 फीट की औसत कमी आ जाती है। फलतः, कोसा उत्पादन की गुणवत्ता एवं मात्रा प्रभावित होती है। इसके अलावा, इस पीड़क कीट के कारण पौधों की मृत्यु-दर 15-30 प्रतिशत तक होने से पौधारोपण में उपगत व्यय व श्रम व्यर्थ ही चला जाता है।

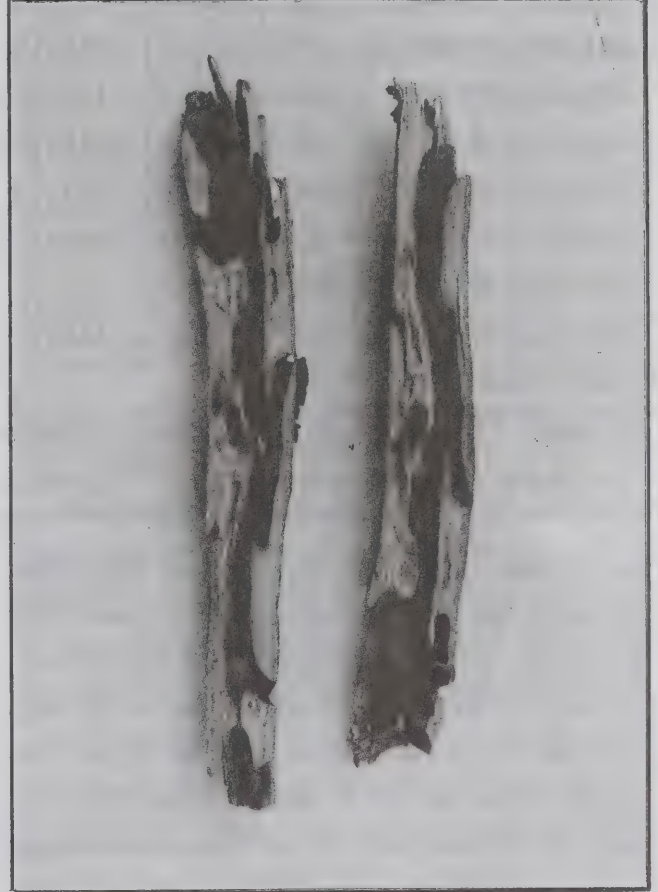
**तसर रेशमकीट के खाद्य पौधे वन्य अवस्था में पाए जाते हैं जिन पर अनेक पीड़क कीटों का आतंक रहता है। इनमें से तना भेदक "स्फेनोप्टेरा क्यूप्रीवेन्ट्रीस केर" पीड़क के लार्वा एवं वयस्क दोनों के प्रकोप से परपोषी पौधे की मृत्यु की संभावना अधिक रहती है। लेखक ने पीड़क कीट की प्रकृति एवं उससे होनेवाली क्षति के विस्तार पर प्रकाश डाला है।**

इस पीड़क कीट की सर्वप्रथम खोज स्टेबिंग ने वर्ष 1914 में तसर के पोषक पौधे एनोजईसस लेटीफोलिया पर किया। तत्पश्चात् सक्सेना एवं अन्य (1986) ने मध्य प्रदेश के बस्तर जिले में असन एवं अर्जुन के पौधों पर इस पीड़क जीव को पाया।

इसके उचित नियंत्रण के लिए विभिन्न अवस्थाओं में इसके द्वारा पोषक पौधे पर क्षति की प्रकृति एवं इसके विस्तार की सीमा का जानना आवश्यक है।

## संचालित अध्ययन

इस दिशा में, बुनियादी बीज गुणन एवं प्रशिक्षण केन्द्र,



चित्र 1 : अनेक अवकोशिकाओं से जर्जर रोगग्रस्त तना

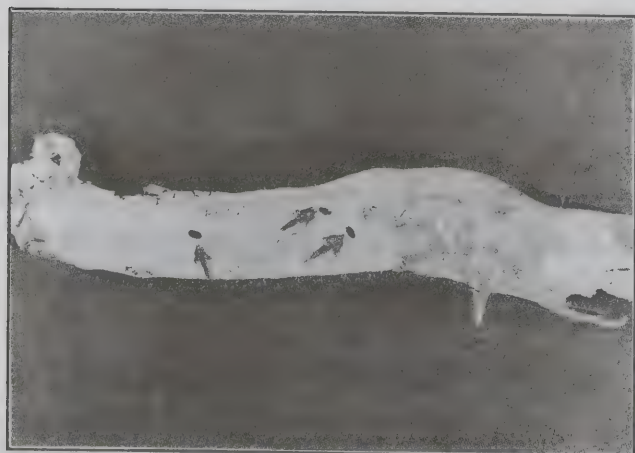
मुडमियाल, विकाराबाद (आंध्र प्रदेश) के तसर कीट पोषक पौधों पर एक अध्ययन संचालित किया गया। प्रतिदिन असन एवं अर्जुन के पौधों से वयस्क पीड़क जीव को एकत्रित कर 24" x 14" x 12" के आकार के जालीदार पिंजरे में रखा गया एवं इसके पोषण के अध्ययन हेतु इसकी जनसंख्या को बनाए रखा गया। इसे समय-समय पर असन एवं अर्जुन की शाखाएं एवं पत्तियाँ पिंजरे में ही प्रदान की गयीं। तत्पश्चात्, इस पीड़क जीव द्वारा शाखाओं एवं पत्तियों की क्षति की प्रकृति एवं विस्तार की जाँच की गई।

इस पीड़क जीव के लार्वा को मुडमियाल फार्म से समय-समय पर एकत्रित किया गया। असन एवं अर्जुन के पौधों पर रोग के प्रकोप की दर का अवलोकन पृथक रूप से किया

**तालिका 1 : विकाराबाद स्थित मुडमियाल तसर फार्म के चुने हुए भू-खंडों में तसर रेशमकीट के पोषक पौधों में अत्यधिक, मध्यम एवं निम्न गोंदीकरण (प्रतिशत में)**

परीक्षण काल	पोषक पौधा	परीक्षित कुल पौधे	अत्यधिक गोंदीकरण	मध्यम गोंदीकरण	निम्न गोंदीकरण	अगोंदीकृत पौधे
मार्च, 1991	टी. अर्जुन	628	22.78	45.54	16.24	15.44
मार्च, 1991	टी. टोमेन्टोसा	112	9.82	18.75	25.00	46.43
मार्च, 1992	टी. अर्जुन	735	18.23	33.33	22.04	26.40
मार्च, 1992	टी. टोमेन्टोसा	131	7.63	14.50	18.32	59.55
मार्च, 1993	टी. अर्जुन	810	16.79	22.46	13.96	46.79
मार्च, 1993	टी. टोमेन्टोसा	186	19.35	31.73	31.96	46.79
मार्च, 1994	टी. अर्जुन	865	7.39	9.02	10.64	72.95
मार्च, 1994	टी. टोमेन्टोसा	204	5.88	12.75	17.16	64.21
औसत $\pm$ मानक विचरण :						
टी. अर्जुन	16.29 $\pm$ 6.46	27.58 $\pm$ 15.56	15.72 $\pm$ 4.80	40.39 $\pm$ 25.29		
टी. टोमेन्टोसा	10.67 $\pm$ 6.00	19.43 $\pm$ 8.57	22.91 $\pm$ 6.50	46.98 $\pm$ 20.89		

गया (तालिका-1)। सर्वप्रथम, दो प्लाट्स के बीच जीवित एवं रोगग्रस्त पौधे से संबंधित आंकड़े लिए गए तथा जीवित पौधों में रोग के प्रकोप की प्रतिशत मात्रा निकाली गयी। स्तंभ भेदक के लक्षण जैसे, तने पर अनियमित गोंद के गुच्छे, निर्गम छिद्र एवं रस-स्राव उपस्थित पौधों को रोगग्रस्त पौधों की श्रेणी में रखा गया। रोग के प्रकोप की तीव्रता का आधार इकाई क्षेत्र में निर्गम छिद्रों, रोगग्रस्त शाखाओं एवं रोगग्रस्त शाखाओं पर पर्ण की संख्या को माना गया। दो निर्गम छिद्रों की दूरी एवं पीड़क स्राव की मात्रा का भी अध्ययन किया गया।



**चित्र 2 : निर्गमन छिद्र प्रदर्शित रोगग्रस्त तना**

## क्षति की प्रकृति एवं विस्तार

पीड़क मादा जीव पोषक पौधों के तने की दरारों एवं कटे-फटे तने के विभिन्न भागों पर मध्य सितंबर से मध्य दिसंबर तक अण्डे देती है। पीड़क जीव रोगग्रस्त पौधे के निकटतम स्वस्थ पौधे पर ही अण्डे देती है। पीड़क जीव के लार्वा सर्वप्रथम, पोषक पौधे के तने के छिलकों में प्रवेश करते हैं। फलस्वरूप, प्रवेश-द्वार पर गोंद स्राव की प्रक्रिया प्रारंभ हो जाती है जो छिद्र के आस-पास छिलकों पर जमा होने लगती है। नवजात लार्वे तने के भीतर अनियमित नलिकाओं का निर्माण करते हुए आगे बढ़ते जाते हैं एवं इस प्रक्रिया के दौरान पौधे का बाह्य छिलका चूर्ण में परिवर्तित होता जाता है जिससे छोटे लार्वों को पहचानना मुश्किल हो जाता है। लार्वे वयस्क होने तक बाह्य कोशिकाओं पर पोषण करते रहते हैं। अनेक छोटे लार्वे एक-दूसरे से निकटतम दूरी पर रहते हुए पोषण प्राप्त करते हैं। ये नलिकाएं विसर्जक पदार्थों से भरी रहती हैं। बहुशाखी नलिकाओं के निर्माण के कारण पोषक पौधे के छिलके ढीले होकर क्रमशः पौधों से पृथक हो जाते हैं जिससे पौधे में नीचे पोषण नहीं हो पाता है। क्षति का विस्तार द्वितीयक जाईलम तक होने पर जाईलम नष्ट हो जाता है तथा पानी एवं खनिज का स्थानांतरण रुक जाता है एवं तना एवं शाखा सुखकर मातृ पौधे से पृथक हो जाते हैं।

लार्वा वयस्क होने पर भेदित करते हुए सेपवूड (रस दारु) तक पहुंचकर दीर्घ वृत्ताकार प्यूपा प्रकोष्ठ का निर्माण करता है जिसका आकार मातृ पीड़क कीट से बड़ा होता है। जब वयस्क पीड़क कीट बाहर निकल जाने पर छिलके के सतह पर दीर्घ गोलाकार निर्गमन छिद्र स्पष्टतः दिखाई देने लगता है।

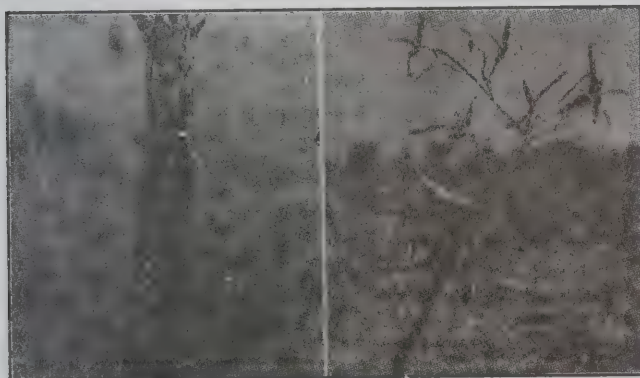
रोगग्रस्त तने को लम्बवत् काटने से उसमें अनेक नलिकाएं या गुहाएं स्पष्टतः दिखाई देने लगती हैं।

## पीड़क कीट एवं पोषण प्रकृति

वयस्क पीड़क कीट पत्तियों एवं तनाओं को कुतरकुतर कर खाता है तो नई शाखाओं के तने के छिलकों को प्राथमिकता देते हुए कभी-कभी पत्तियां भी खाता है। अत्यधिक दुष्प्रभावित शाखाएं तीव्र आंधी के जोर से टूटकर गिर जाती हैं। सामान्यतः



तालिका 2 : असन पौधे के विभिन्न मोटाई की शाखाओं पर स्फेनोटेरा क्यूप्रीवेन्ट्रीस के रं के लार्वा की उपस्थिति (वर्ष 1993)						
परीक्षित पौधे	शाखाएं	रोगग्रस्त शाखाएं	शाखाओं की मोटाई (सेमी)		प्रति शाखा लार्वों की संख्या	
			श्रेणी	औसत	श्रेणी	औसत
9	32	26	10.5-15.5	12.6	4-12	8.6
12	39	31	15.5-18.5	16.4	3-18	14.4
10	41	33	18.5-22.5	20.2	6-14	12.1
13	26	16	22.5-26.5	24.8	8-10	9.3
11	21	12	26.5-28.5	27.2	6-12	8.2
6	18	8	28.5-31.5	29.1	3-8	5.3
शाखाओं की मोटाई के साथ प्रतिशत विचरण गुणांक (सी.बी. %)			-	29.66	-	32.95



चित्र 3 : रोग ग्रसित पौधा एवं गोन्दीकरण

वयस्क पीड़क कीट अर्जुन की अपेक्षा असन के पौधों को अधिक प्राथमिकता देते हैं।

### प्रकोप की तीव्रता

पीड़क कीट, अर्जुन एवं असन के नवजात एवं वृद्ध दोनों पौधों पर आक्रमण करता है। रोगग्रस्त पौधों की शाखाओं एवं पौधों की मृत्यु अप्रैल से जून के मध्य अधिक होती है। आक्रमण तीव्र होने पर तने छिद्रित कर दिए जाते हैं एवं अन्दर ही अन्दर अनेक नलिकाओं का निर्माण होता है। रोग के प्रकोप की तीव्रता पोषक पौधे में गोंद स्राव की तीव्रता के समतुल्य होती है। रोगग्रस्त क्षेत्र के अधर भाग से टूटकर पृथक हुई शाखा के अवलोकन से पता

चलता है कि नलिकाओं में पीले रंग का स्राव एवं विसर्जित पदार्थ भरा है।

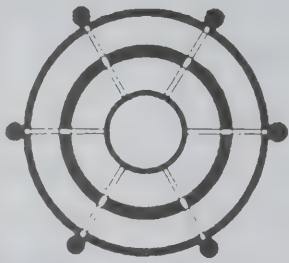
पीड़क कीट से क्षति की प्रकृति एवं विस्तार उसके पोषण आचरण एवं पोषक पादप की रासायनिक संरचना पर निर्भर करती है (येट्स 1984)। लार्वों द्वारा बनायी गयी अवकोशिकाओं का क्रम अनियमित होता है। वर्तमान अध्ययन में देखा गया कि स्तंभ भेदक की क्रियाशीलता तने के पूर्वी अर्धांग पर अधिक है।

असन की अपेक्षा अर्जुन के पौधे अधिक प्रभावित होते हैं (तालिका-1)। यद्यपि वर्ष 1991 के दौरान गोंदीकरण की कुल

तालिका 3 : असन पौधों पर स्फेनोटेरा क्यूप्रीवेन्ट्रीस के रं में व्यस्क के पाये जाने की आवतन दर							
भू-खंड	परीक्षित पौधे	रोगग्रस्त पौधे	रोग प्रतिशतता	प्रति वृक्ष निर्गमन छिद्रों की संख्या		निर्गम छिद्रों के बीच की दूरी (सेमी)	
				श्रेणी	औसत	श्रेणी	औसत
1	42	30	71.43	12-53	35	2.7-18.8	9.5
2	55	44	80.00	10-48	29	3.8-19.5	12.8
3	63	52	82.54	15-56	32	2.6-14.8	10.6
4	69	53	76.81	11-45	26	5.2-22.1	16.3
5	56	41	73.21	8.39	19	4.5-20.6	15.7
6	73	58	79.45	18-64	38	6.1-26.5	18.2
औसत $\pm$ मानक विचरण :			77.24	29.83		13.85	
			$\pm$ 4.26	$\pm$ 6.79		$\pm$ 3.43	
विचरण गुणांक (%)			5.51	22.76		24.76	

प्रतिशतता अर्जुन की अपेक्षा असन के पौधों में अधिक पाई गई, अत्यधिक गोंद स्रावित करनेवाले पौधों की प्रतिशतता अर्जुन में अधिक थी। किन्तु, वर्ष 1993 में अर्जुन पर पीड़क कीट के यांत्रिकी एवं रासायनिक नियंत्रण एवं रोकथाम किये जाने पर रोग के प्रकोप की तीव्रता असन में बढ़ गई। अर्जुन रोग पर नियंत्रण के कारण घट गयी। इसके अतिरिक्त स्फेनोटेरा क्यूप्रीवेन्ट्रीस के लार्वा एवं वयस्क द्वारा तसर कीट के पोषक पौधों पर रोग के आक्रमण की क्षमता एवं तीव्रता अलग-अलग पायी गयी।

प्रथम व तृतीय लेखक क्षेत्रअके, भंडारा, द्वितीय लेखक प्राणि विज्ञान विभाग, उस्मानिया विश्वविद्यालय, हैदराबाद जबकि चतुर्थ लेखक केतअ व प्रस, रांची में कार्यरत हैं।



# Exports Review

Foreign exchange earnings of the Indian silk industry during the month of November '97 amounted to Rs. 6810.66 lakh compared to Rs. 7035.80 lakh during November '96.

During April to November '97

## Review of Silkgoods Certified for Exports

During November 1997 and April to November '97 period of the year 1997-98

TABLE - I

### Export Performance of Indian Silk Industry

(Unit : Lakh ; Qty : Silkgoods ; Sq. Mtrs. ; Silkyarn/Silkwaste : Kg ; Value : Rs.)

Unit : Lakh ; Qty : Silkgoods ; Sq. Mtrs. ; Silkyarn/Silkwaste : Kg ; Value : Rs.)

Item of Export	November				% Increase		April to November				% Increase	
	1997		1996				1997-98		1996-97			
	Qty.	Value	Qty.	Value	Qty.	Value	Qty	Value	Qty.	Value	Qty.	Value
A. Silkgoods :												
(1) Mulberry												
(i) Dress Material	15.32	2802.29	16.83	2786.00	-9.0	0.6	125.93	21894.60	134.43	21840.48	-6.3	0.2
(ii) Readymade Garments	2.60	777.95	7.76	1861.24	-66.5	-58.2	37.53	11133.02	71.00	15140.82	-47.1	-26.5
(iii) Carpets	0.33	1576.70	0.10	858.01	230.0	83.8	1.00	7332.27	0.66	5301.80	51.5	38.3
(iv) Sarees	1.41	268.17	1.69	321.78	-16.6	-16.7	20.86	4368.37	23.61	4417.61	-11.6	-1.1
(v) Scarves/stoles	3.19	397.01	5.63	534.03	-43.3	-25.7	35.60	3810.24	51.58	4912.65	-31.0	-22.4
(vi) Others	2.01	482.69	2.09	393.48	-3.8	22.7	19.11	3871.16	21.63	3671.16	-11.7	5.4
Mulberry Total [i to vi]	24.86	6304.81	34.10	6754.54	-27.1	-6.7	240.03	52409.66	302.91	55284.52	-20.8	-5.2
(2) Tasar	1.02	154.16	0.90	150.95	13.3	2.1	5.60	881.11	6.42	1186.74	-12.8	-25.8
Total [1+2]@	25.88	6458.97	35.00	6905.49	-26.1	-6.5	245.63	53290.77	309.33	56471.26	-20.6	-5.6
(3) Mixed/Blended	1.98	205.12	0.89	130.31	122.5	57.4	16.80	2309.59	13.74	1435.06	22.3	60.9
Total [1+2+3]	27.86	6664.09	35.89	7035.80	-22.4	-5.3	262.43	55600.36	323.07	57906.32	-18.8	-4.0
B. SILKYARN	0.02	5.92	-	-			0.15	67.26	0.04	43.42	275.0	54.9
C. SILKWASTE	0.72	140.65	-	-			4.35	783.09	0.08	11.40		
TOTAL [A+B+C]		6810.66		7035.80		-3.2		56450.71		57961.14		-2.6
@ Refers to total natural silk												

@ Refers to total natural silk goods exports

period of the year 1997-98, foreign exchange earnings from silkgoods certified for exports amounted to Rs. 56450.71 lakh as against Rs. 57961.14 lakh during the corresponding period of previous year.

Data on itemwise silkgoods certified for exports by Central Silk Board are given in Table - I.

Comparative data on region-wise silkgoods certified for exports are given in Table-II.

### Natural silkgoods

During November '97, the natural silkgoods certified for exports amounted to 25.88 lakh sq. mtrs. valued at Rs. 6458.97 lakh as against 35 lakh sq. mtrs. valued at

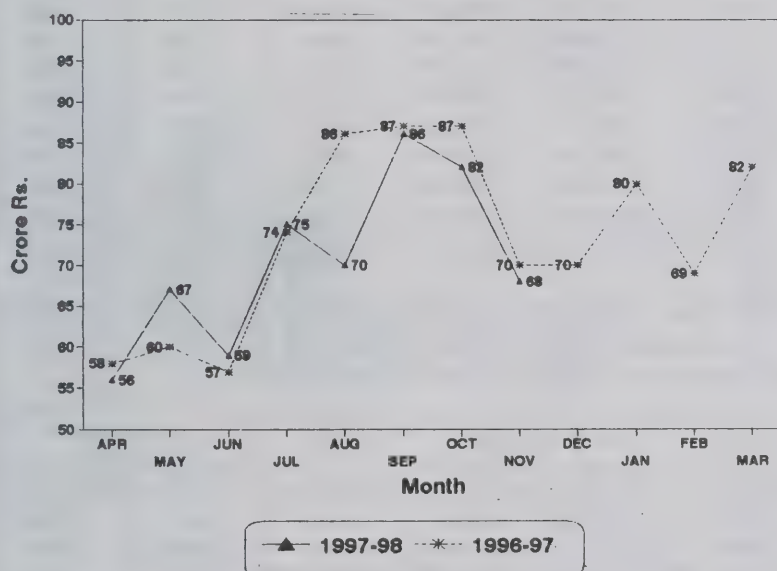


**Table - II**  
**Regionwise Silkgoods certified for exports**

[Unit: Lakh; Qty: Sq. mtrs; Value: Rs.]

Region	November						April to November					
	1997		1996		% Increase		1997-98		1996-97		% Increase	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
West Europe	12.50	3411.73	15.52	3013.36	-19.5	13.2	104.28	22492.57	124.94	22658.91	-16.5	-0.7
U.S.A. & Others	8.58	2046.19	13.25	2775.81	-35.2	-26.3	93.09	21500.51	125.34	24025.35	-25.7	-10.5
Asia	5.49	876.28	5.76	952.75	-4.7	-8.0	52.13	8501.98	52.88	7706.43	-1.4	10.3
Japan & Others	0.54	183.96	0.58	153.02	-6.9	20.2	5.19	1395.99	6.91	1616.61	-24.9	-13.6
Africa	0.48	119.07	0.69	120.07	-30.4	-0.8	5.19	1416.22	4.87	1002.99	6.6	41.2
East Europe	0.27	26.86	0.09	20.79	200.0	29.2	2.55	293.09	8.13	896.03	-68.6	-67.3
Total	27.86	6664.09	35.89	7035.80	-22.4	-5.3	262.43	55600.36	323.07	57906.32	-18.8	-4.0

### Silk Export Earnings



Rs. 6905.49 lakh during the corresponding month of previous year.

During April to November '97 period of the year 1997-98, the aggregate natural silkgoods certified for exports amounted to 245.63 lakh sq. mtrs. valued at Rs. 53290.77 lakh as against 309.33 lakh sq. mtrs. valued at Rs. 56471.26 lakh during the corresponding period of preceding year and showed a decrease of 20.6% in quantity and 5.6% in value.

### Mulberry silkgoods

During November '97, mulberry silkgoods certified for exports amounted to 24.86 lakh

**Table - III**  
**Centrewise/Varietywise Silkgoods/Silkyarn/Silkwaste certified for exports during April to November '97 period of the year 1997-98**

[Unit: Lakh; Qty: Silkgoods: Sq. mtrs; Silkyarn/Silkwaste: Kg; Value: Rs.]

Centre	Mulberry		Tasar		Mixed Blended		Sub-Total		% Share		Silkyarn		Silkwaste		Grand Total Value	% Share of Centre
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value		
Mumbai	27.72	6088.77	1.26	305.91	2.43	527.24	31.40	6921.92	12.0	12.4	0.10	24.29	0.00	0.00	6946.21	12.3
Bangalore	86.40	15413.30	0.29	45.63	4.71	225.47	91.40	15684.40	34.8	28.2	0.03	33.37	0.00	0.00	15717.76	27.8
Bhagalpur	8.23	1022.07	0.42	76.38	2.20	205.95	10.85	1304.40	4.1	2.3	0.00	0.00	0.00	0.00	1304.40	2.3
Chennai	7.99	2108.53	0.10	22.33	1.18	167.85	9.27	2298.71	3.5	4.1	0.00	0.00	4.23	760.71	3059.43	5.4
Calcutta	32.49	5377.39	2.44	285.17	1.05	52.97	35.99	5715.53	13.7	10.3	0.02	9.60	0.11	22.37	5747.50	10.2
New Delhi	72.18	21368.11	0.80	95.92	0.32	55.59	73.30	21519.62	27.9	38.7	0.00	0.00	0.00	0.00	21519.62	38.1
Varanasi	4.32	574.99	0.28	49.77	4.92	1074.52	9.51	1699.28	3.6	3.1	0.00	0.00	0.00	0.00	1699.29	3.0
Srinagar	0.05	350.77	0.00	0.00	0.00	0.00	0.05	350.77	0.0	0.6	0.00	0.00	0.00	0.00	350.77	0.6
Hyderabad	0.65	105.73	0.00	0.00	0.00	0.00	0.65	105.73	0.2	0.2	0.00	0.00	0.00	0.00	105.73	0.2
Total	240.03	52409.66	5.60	881.11	16.80	2309.59	262.43	55600.36	100.0	100.0	0.15	67.26	4.35	783.09	56450.71	100.0

**Table - IV**  
**Foreign Exchange Earnings from Mulberry Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	November		%	April to November		%	Country Share Percentage in	
	1997	1996		1997-98	1996-97		1997-98	1996-97
U.S.A.	1703.21	2432.00	-30.0	18517.70	20871.84	-11.3	35.3	37.8
Germany	1340.04	1067.14	25.6	8018.97	7849.15	2.2	15.3	14.2
U.K.	593.76	706.28	-15.9	4964.01	5624.89	-11.7	9.5	10.2
France	371.88	251.73	47.7	2153.92	1814.17	18.7	4.1	3.3
Italy	330.43	333.82	-1.0	1737.33	1449.99	19.8	3.3	2.6
Canada	147.83	223.21	-33.8	1674.69	1851.29	-9.5	3.2	3.3
U.A.E.	177.23	151.95	16.6	1634.72	1469.14	11.3	3.1	2.7
Singapore	16.75	73.76	-77.3	1415.55	1500.68	-5.7	2.7	2.7
Hong Kong	171.85	288.49	-40.4	1377.00	1395.21	-1.3	2.6	2.5
Netherlands	122.69	111.81	9.7	976.04	1149.22	-15.1	1.9	2.1
Denmark	115.16	34.14	237.3	753.43	475.91	58.3	1.4	0.9
Australia	55.80	52.59	6.1	681.21	871.54	-21.8	1.3	1.6
Switzerland	145.31	75.09	93.5	631.93	659.22	-4.1	1.2	1.2
Thailand	81.97	24.51	234.4	598.97	238.23	151.4	1.1	0.4
Mauritius	30.84	19.85	55.4	524.46	301.55	73.9	1.0	0.5
Spain	56.11	42.86	30.9	469.78	555.78	-15.5	0.9	1.0
Malaysia	6.46	6.06	6.6	431.25	367.19	17.4	0.8	0.7
Japan	78.00	64.56	20.8	425.06	469.22	-9.4	0.8	0.8
Austria	54.13	133.02	-59.3	363.21	559.84	-35.1	0.7	1.0
Belgium	38.34	60.69	-36.8	351.56	485.26	-27.6	0.7	0.9
Others	667.02	600.98	11.0	4708.87	5325.20	-11.6	9.0	9.6
Total	6304.81	6754.54	-6.7	52409.66	55284.52	-5.2	100.0	100.0

@ Refers to top 20 importing countries

**Table - V**  
**Foreign Exchange Earnings from Tasar Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	November		%	April to November		%	Country Share Percentage in	
	1997	1996		1997-98	1996-97		1997-98	1996-97
Germany	33.51	43.94	-23.7	148.02	234.83	-37.0	16.8	19.8
U.S.A.	14.48	35.00	-58.6	123.21	245.24	-49.8	14.0	20.7
Hong Kong	24.87	1.04	2291.3	95.47	12.31	675.5	10.8	1.0
U.A.E.	19.05	9.86	93.2	90.40	115.84	-22.0	10.3	9.8
Japan	16.89	15.41	9.6	69.64	104.59	-33.4	7.9	8.8
France	10.15	6.44	57.6	66.34	43.69	51.8	7.5	3.7
Italy	4.40	6.84	-35.7	43.62	44.35	-1.6	5.0	3.7
U.K.	15.15	14.10	7.4	30.18	81.97	-63.2	3.4	6.9
Spain	4.71	0.88	435.2	29.47	13.10	125.0	3.3	1.1
Brazil	-	1.12	-100.0	25.70	20.28	26.7	2.9	1.7
Turkey	0.75	0.58	29.3	16.51	10.10	63.5	1.9	0.9
South Africa	0.20	-	-	13.15	10.97	19.9	1.5	0.9
Belgium	0.87	0.48	81.3	12.61	3.29	283.3	1.4	0.3
Kuwait	-	0.16	-	12.44	23.77	-47.7	1.4	2.0
Saudi Arabia	-	-	-	11.46	4.19	173.5	1.3	0.4
Colombia	-	-	-	9.60	-	-	1.1	0.0
Argentina	3.00	1.10	172.7	8.07	2.14	277.1	0.9	0.2
Canada	-	0.95	-	7.43	26.85	-72.3	0.8	2.3
Chile	-	-	-	6.85	4.29	59.7	0.8	0.4
Yugoslavia	-	-	-	6.51	9.70	-32.9	0.7	0.8
Others	6.13	13.05	-53.0	54.43	175.24	-68.9	6.2	14.8
Total	154.16	150.95	2.1	881.11	1186.74	-25.8	100.0	100.0

@ Refers to top 20 importing countries

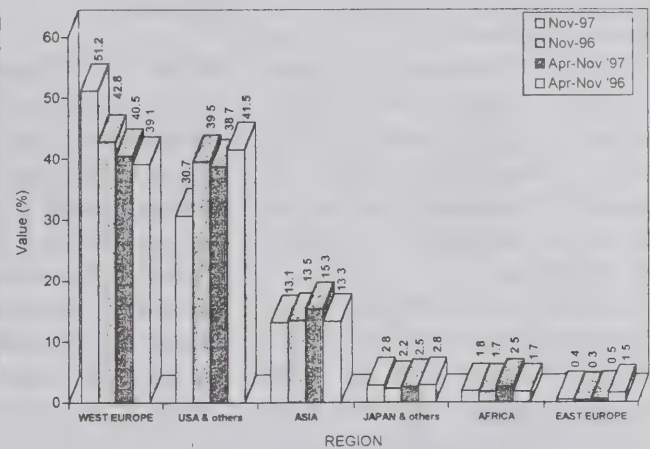
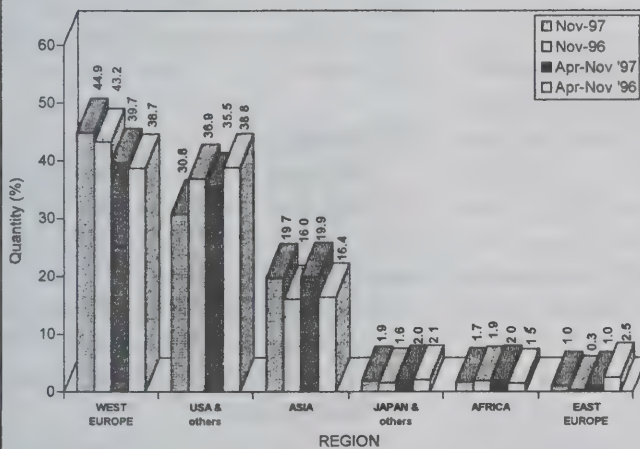


**Table - VI**  
**Unit Export Price**

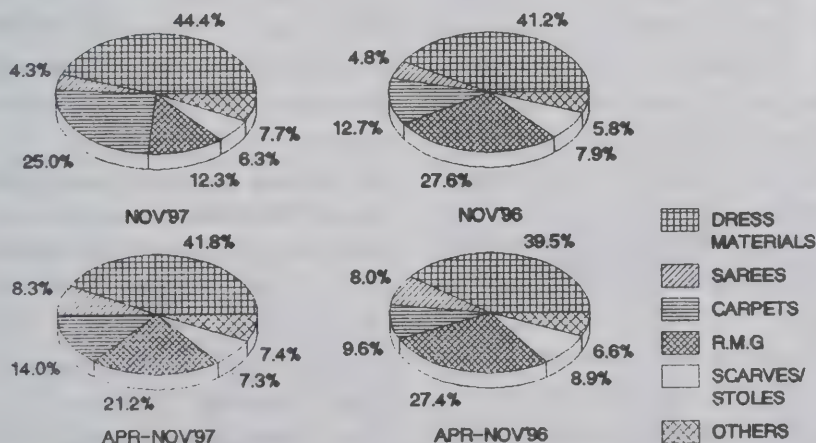
(Rs. per Sq.mtr.)

Item	November			April-November		
	1997	1996	% Increase	1997-98	1996-97	% Increase
<b>A. Mulberry Silkgoods</b>						
1. Excl. Carpets	192.79	173.41	11.2	188.59	165.37	14.0
2. Incl. Carpets	253.67	198.07	28.1	218.35	182.51	19.6
3. Carpets	4779.47	8678.19	-44.9	7306.62	8042.54	-9.2
<b>B. Tasar Silkgoods</b>	150.66	168.19	-10.4	157.35	184.76	-14.8

### REGION-WISE SILKGOODS CERTIFIED FOR EXPORTS



### Share percentage of Varietywise Mulberry Silkgoods Export Earnings



sq.mtrs. valued at Rs. 6304.81 lakh as against 34.10 lakh sq. mtrs. valued at Rs. 6754.54 lakh during November '96.

During April to November '97 period of the year 1997-98, mulberry silkgoods certified for exports amounted to 240.03 lakh sq. mtrs. valued at Rs. 52409.66 lakh compared with 302.91 lakh sq. mtrs. valued at Rs. 55284.52 lakh during the corresponding period of 1996-97. It showed a decrease of 20.8% in quantity and 5.2% in value. Out of the total natural silkgoods certified for exports, the share of mulberry silkgoods roughly amounted to 98% both in quantity and value.

Countrywise data of mulberry silkgoods certified for exports is given in Table - IV.

#### **Varietywise mulberry silkgoods**

During April to November '97 period of the year 1997-98, among the various varieties of mulberry silkgoods certified for exports, dress materials ranked first followed by readymade garments, carpets, sarees and scarves/stoles. Data of varietywise mulberry silkgoods certified for exports are given in Table - I.

#### **Tasar silkgoods**

During November '97, tasar silkgoods certified for exports amounted to 1.02 lakh sq.mtrs. valued at Rs. 154.16 lakh compared with 0.90 lakh sq.mtrs. valued at Rs. 150.95 lakh during November '96.

During April to November '97 period of the year 1997-98, a total quantity of 5.60 lakh sq. mtrs. of tasar silkgoods valued at

Rs. 881.11 lakh were certified for exports as against 6.42 lakh sq. mtrs. valued at Rs. 1186.74 lakh during the corresponding period of previous year.

Countrywise data of tasar silkgoods certified for exports are given in Table-V.

#### **Unit export price**

The unit export price realised for mulberry and tasar silkgoods during November '97 and April to November '97 period of the year 1997-98 along with comparative data of previous year are given in Table-VI.

#### **Mixed or blended silkgoods**

During November '97, mixed/blended silkgoods certified for exports amounted to 1.98 lakh sq.mtrs. valued at Rs. 205.12 lakh compared with 0.89 lakh sq. mtrs. valued at Rs. 130.31 lakh during November '96 and showed an increase both in quantity and value.

Mixed/blended silkgoods certified for exports during April

to November '97 period of the year 1997-98 amounted to 16.80 lakh sq. mtrs. valued at Rs. 2309.59 lakh compared with 13.74 lakh sq. mtrs. valued at Rs. 1435.06 lakh in the corresponding period of previous year and reflected an increase of 22.3% in quantity and 60.9% in value.

#### **Silkyarn**

About 15 tons of spun and noil silk yarn valued at Rs. 67.26 lakh has been certified for exports during April to November '97 period of the year 1997-98 as against 4 tons valued at Rs. 43.42 lakh in the corresponding period of 1996-97.

#### **Silkwaste**

Silkwaste and its bye-products certified for exports during April to November '97 period of the year 1997-98 amounted to 435 tons valued at Rs. 783.09 lakh as against 8 tons valued at Rs. 11.40 lakh in the corresponding period of previous year.

(Contd. from page 31)

Dharmavaram sarees is eroding gradually. Quality aspect is overlooked in the race for richness'. He further opines that low cost pushes up demand at the cost of quality.

The latest technological innovations have not made much inroads in Dharmavaram. The weavers are not willing to go for powerlooms. The maintenance of handlooms is not good. The frames are not sturdy and the reeds are often damaged. A number of weavers still depend on hand punched card.

Most of the dyers have limited knowledge of dye stuff. The dyes and chemicals are stored improp-

erly. Many dyers degum and dye in a common bath. All this leads to unstandard dyeing quality.

All these grey areas call for corrective measures and agencies involved in the cause of promoting silk industry could play a vital role in bringing about necessary changes in areas lagging behind through education and dissemination of the latest technological package.

This is not to suggest that the Dharmavaram silks are on the wane. On the contrary, the demand for these sarees is soaring day-by-day. Excellence can be achieved only by correcting drawbacks and maneuvering techno-

logical innovations. Dharmavaram silks can conquer new horizons by infusing a little dose of technical know-how in all spheres of the silk industry.

As we bade good-bye to Dharmavaram, the sound of the loom was echoing in our ears and eyes were lost in the tantalizing colours of the silk yarns.

*The authors are with Indian Silk, Central Silk Board, Bangalore. Inputs from Shri Obilleshu, SERIFED, Shri P. Mathiazghan, SCTH, Dharmavaram and Shri B.T. Krishnamurthy, CSTRI, Bangalore. Photo Courtesy : Shantala Silk House, Nalli Silks Arcade, SCTH, Dharmavaram and CSTRI, Bangalore*

### ***Splendrous Silks of Dharmavaram***



# Silk Prices

November 1997

## Raw Silk : Volume of Transaction

At all the silk exchanges in Karnataka, a total quantity of 149.362 tons of all qualities of raw silk valued at Rs.1593.087 lakh was transacted during the month of November '97 as against a quantity of 124.472 tons valued

Exchange alone accounted for 74.6% and 70.2% in both quantity and value, respectively.

During the first eight months of the year 1997-98 (i.e., April to November '97) at Bangalore Silk Exchange, a total quantity of 915.629 tons of all qualities of raw silk valued at Rs. 8970.777 lakh was transacted. The volume of trade

at Bangalore Silk Exchange during the period April to November '97 accounted for 80% in quantity and 76.3% in value of the total transaction in all silk exchanges of the State.

Data on qualitywise transaction of raw silk at Bangalore Silk Exchange vis-a-vis all the silk exchanges in Karnataka during November '97, November '96, April

**Table I. Transaction of Raw Silk at Bangalore Silk Exchange**

Raw Silk Quality	(Qty. : Tons, Value : Lakh Rs.)							
	November '97		November '96		April '97-November '97		April '96-November '96	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Filature/ Cottage Basin	21.259 (49.080)+	289.568 (657.197)	19.834 (32.431)	269.779 (442.400)	167.336 (315.251)	2165.446 (4083.581)	170.629 (309.308)	2253.376 (4058.638)
Charka	66.493 (75.647)	706.612 (808.094)	60.244 (66.600)	684.807 (765.805)	552.449 (626.306)	5717.857 (6531.551)	516.276 (608.040)	5655.492 (6695.137)
Dupion	23.678 (24.635)	122.143 (128.696)	25.300 (25.441)	144.855 (145.855)	195.844 (203.283)	1087.474 (1141.993)	182.820 (183.758)	1077.850 (1083.734)
Total	111.430 (100.282)	1118.323 (1593.987)	105.378 (124.472)	1099.441 (1354.060)	915.629 (1144.840)	8970.777 (11757.125)	869.725 (1101.106)	8986.718 (11837.509)

+ Figures in bracket refer to total transaction at all the Silk Exchanges in Karnataka

at Rs. 1354.060 lakh during November '96. During the first eight months of the year of 1997-98 (i.e., April to November '97), at all silk exchanges in Karnataka, a total quantity of 1144.840 tons valued at Rs. 11757.125 lakh was transacted as against 1101.106 tons valued at Rs. 11837.509 lakh of the preceding year.

## Bangalore Silk Exchange

At Bangalore Silk Exchange, which is the largest exchange in Karnataka, a total quantity of 111.430 tons of all qualities of raw silk viz., filature/cottage basin, charka and dupion, valued at Rs. 1118.323 lakh was transacted during November '97 as compared to 105.378 tons valued at Rs. 1099.441 lakh during November '96. Of the total transaction in the State, the volume of transaction at Bangalore Silk

**Table II. Transaction of Filature raw silk of different deniers at Bangalore Silk Exchange during November '97**

Denier	Quality	Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
				Min.	Max.	Avg.
13/15	Fine	1083	1554045	1350	1480	1435
14/16	Fine	1443	2015562	1225	1440	1397
16/18	Fine	4111	5634970	1051	1480	1371
18/20	Medium	4776	6567759	1185	1480	1375
20/22	Medium	6303	8085382	255	1550	1283
22/24	Medium	227	289071	1220	1350	1276
24/26	Medium	373	470802	1170	1375	1263
26/28	Coarse	2602	3860337	1110	1575	1483
28/30	Coarse	164	229364	1380	1400	1396
30/32	Coarse	177	249508	1250	1540	1410
	Total	21259	28956800	255	1575	1362

**Table IIa. Transaction of Charka raw silk of different varieties at Bangalore Silk Exchange during November '97**

Varieties	Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
			Min.	Max.	Avg.
Coarse	3020	2651765	400	1017	878
Medium	19433	17947990	704	1100	924
Fine	44040	50061445	750	1390	1137
Total	66493	70661200	400	1390	1063



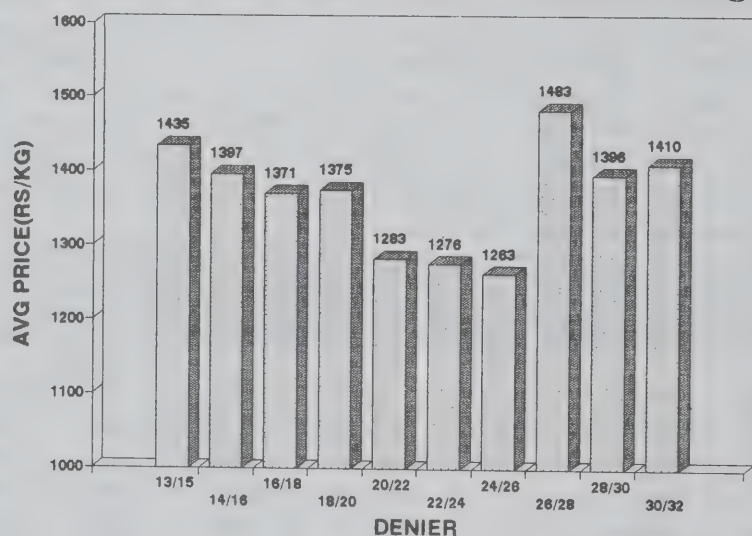
**Table III. Prices of Indigenous Silk**

(Rs./Kg)							
Silk Exchange	Variety	November '97			November '96		
		Min	Max	Avg	Min	Max	Avg
Bangalore Silk Exchange (Karnataka)	Filature/Cottage Basin	255	1575	1362	720	1625	1360
	Charka	400	1390	1063	400	1450	1137
	Duplon	201	825	516	250	875	573
Anna Silk Exchange, Kanchipuram Market (Tamil Nadu)	Filature/Cottage Basin	1025	1260	1222	1150	1430	1287
	Charka	730	945	911	830	1100	930

**Table III (contd). Imported Silk (Varanasi Market)**

(Rs./Kg)				
Filature Silk 20/22 dr.	November '97		November '96	
	Min	Max	Min	Max
Chinese	1500	1650	1250	1375
Korean	1520	1650	1250	1330

**Average Prices of Denierwise Filature  
Raw Silk Transacted at Bangalore Silk Exchange**



'97 to November '97 and April '96 to November '96 are given in Table-I. The transaction of raw silk of different deniers of filature/cottage basin and charka raw silk at Bangalore Silk Exchange during November '97 is given in Table-II. Qualitywise charka rawsilk transaction during November '97 are given in Table-IIa.

#### Prices of sericultural commodities

The prices of different qualities of indigenous raw silk ruled at Bangalore Silk Exchange (Karnataka) and Anna Silk Exchange (Tamil Nadu) in addition to prices of imported raw silk at Varanasi market during November '97 in comparison with November '96 are given in Table - III.

The prices of different varieties of mulberry reeling cocoons quoted at important cocoon markets of southern states viz., Karnataka, Tamil Nadu and Andhra Pradesh are given in Table IV.

**Table IV. Mulberry Reeling Cocoon Prices**

(Rs/kg.)						
State	Market	Variety	November '97		November '96	
			Min	Max	Min	Max
Karnataka	Ramanagaram	Imp. cross breed	50	151	70	172
	T. Narasipur	Ord. cross breed	32	80	32	100
Tamil Nadu	Vaniyambadi	Imp. cross breed	50	107	63	127
	Coimbatore	Imp. cross breed	70	120	80	142
Andhra Pradesh	Hyderabad	Multivoltine	31	114	36	147
	Dharmavaram	Multivoltine	40	125	27	143

Compiled by Statistical Section, CSB

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# Assistance to Sericulture : Need for Rationalisation

*In the recent years, there seems to be a perceivable shift in the demand and production pattern of silk goods in the country. One can notice increased diversification in the designs and specifications of the fabrics, including the traditional sarees. The market is demanding more and more light weight fabrics with newer designs and colour shades. This has necessitated the industry to look for quality silk on par with the imported one. And to produce quality silk, we need to upgrade our technology at different levels.*

*Such an upgradation most of the times calls for additional investment. It may be as simple as increased doses of fertilizers, digging a well for irrigation, buying a pump set or a generator, construction of a rearing house, purchase of adequate number of rearing equipments or just maintenance of the existing garden in the on-farm sector which would call for smaller investment. It may be a capital investment in the non-farm sector to replace the obsolete reeling or weaving machinery or the expansion of an existing unit to be more viable, so on and so forth. It may be just a working capital needed to keep the wheels rolling. It is here, the crux of the problem lies. With his poor investment capabilities, the sericulturist or the silkman finds it often difficult to resource such needs. The upgradation attempt stops here, unless he gets timely institutional support.*

*It is not that this problem was not identified or addressed earlier. There are a*

*number of schemes at different levels to meet the credit needs of the industry. What is concerning is the slow inflow of the credit and the procedural constraints that exist. The financial institutions too find it difficult to lend for want of one or the other document or the collateral. These issues were deliberated at length in a national workshop on 'Assistance to Sericulture' organised recently by the Central Silk Board, wherein the industry, policy makers and the financial institutions were adequately represented (Details, elsewhere in the issue).*

*Keeping in view the advantages of the minimum investment needs and the quick returns as well as the high value addition potential that the sericulture industry has, there is no reason why the financial institutions should not come forward to pump more credit to the sector. The effective implementation of the separate credit line for sericulture introduced of late by NABARD would help keeping the procedural requirements to the minimum. Besides, unification of various schemes will lead to rationalisation of the assistance available. Any credit support extended to upgrade the technology should ensure quality production besides making the unit economically viable. This inturn will encourage the quality lending.*

*What is needed is the collective approach of all the concerned to bring a qualitative change in this industry producing the royal fibre that the world prefers to adore forever.*

 **Editor**

## Question and Answer

**Biswajit Basak,**  
**Raniganj University College,**  
**West Bengal.**

### **Q.1: What are the reasons behind the diapause of tasar pupae and eggs of *B.mori* ?**

**A:** Diapause, an arrested state of development is primarily determined by in-built genetic and endocrinological system mediated by environmental conditions such as temperature, humidity, photoperiod and also the availability of food which slows down the physiological development as an adaptation to overcome the adverse seasons.

In tasar (*Antheraea*), the lack of ecdysone has been shown to be responsible for the induction and maintenance of diapause in pupal stage. Photoperiodic receptor linked to the neuro-secretory cells of the pupal brain to produce prothoracicotropic hormone (PTTH) and in the absence of PTTH, the prothoracic gland stops producing the growth-promoting hormone (Ecdysone) leading to diapause.

In *Bombyx mori*, the diapause is almost maternal and is characterised by biochemical event by interacting with the environment through endocrine system. Within the endocrine system, subesophageal ganglion plays a very

vital role in the induction of diapause by secreting an active principal known as "diapause hormone" leading to embryonic diapause.

### **Q. 2: Why diapause does occur in pupa of *A.mylitta* and why not in eggs?**

**A:** Though both mulberry and tasar silkworm are sericigenous insects, they belong to separate families. Diapause occurs at different stages of their life-cycle viz., embryonic diapause in *Bombyx mori* & *Melanoplus differentialis*; larval diapause in *Cydia pomonella* and *Gilpinia polytoma*; pupal diapause in *Antheraea mylitta* and *Hyalophora cecropia*; or adult diapause in *Leptionotarsa decemlineata* and *Eurydema* spp which is specifically fixed in each species. For details, refer "Comprehensive Insect Physiology, Biochemistry and Pharmacology" by Kerkut and Gilbert (1985) and "Principles of Insect Physiology" by Wigglesworth (1972).

### **Q. 3: How does pebrine disease spread transovarially ?**

**A:** Pebrine disease in silkworm is caused by the parasitic microsporidians *Nosema bombycis* which is transmitted through the mother moths. During transovarial transmission, the pebrine spores pass through the eggs to the next generation.

While feeding mulberry leaves, the spores are ingested by silkworm larvae which hatch in the gut and form sporoplasm to become trophozoite. It further divides to produce schizonts by binary or multiple fission. Repeated fission of schizonts forms sporants which come out of the cell and spread to different parts of the body.

The pathogen completes its life-cycle within 4 days. In the rearing bed, the infected larvae drop faeces containing spores of pebrine. Larvae hatched from infected eggs are the primary source for spread of disease. Transovarially infected larvae die within second moult, if the spore load is high.

The larvae infected during the second instar show disease symptoms in late fourth/fifth instar and die before spinning. If healthy larvae are reared along with the infected ones, secondary contamination through faecal matter occurs in fourth or fifth stage. These larvae spin normal cocoons but the pupae/moths carry the pebrine spores to the next generation through eggs. After the deposition of eggs, the pathogen undergoes multiplication and develops in the embryo or in the body of the silkworm in the next generation.

## *Readers Write*

The **Letters to the Editor** column is an open forum where anyone who wants to say anything about sericulture and silk industry as well as articles/features published in **Indian Silk** is welcome to do so. Please make your letters brief and to the point. Send your letters to the Editor.



# Soil Moisture Management in Mulberry

Rama Kant, Y.R. Madhava Rao and A. Sarkar

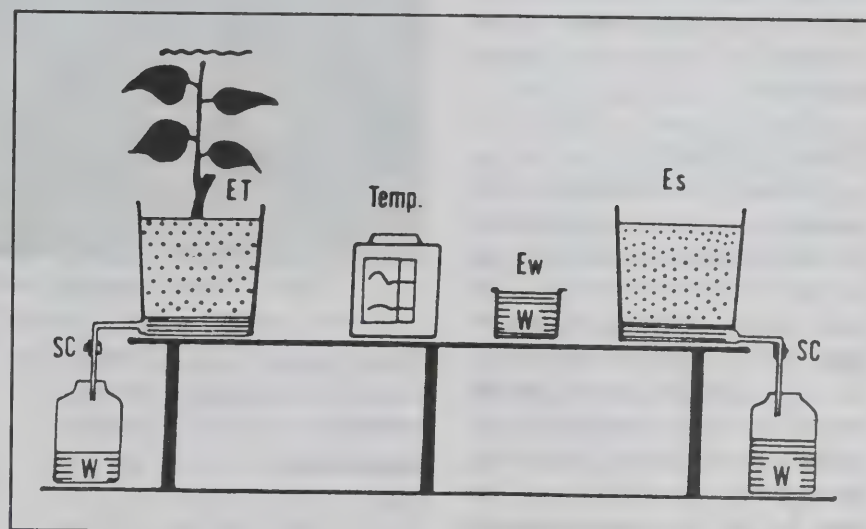
**I**rrigation is very important in mulberry garden management. Therefore, the method, time, quantity and quality have to be decided properly to meet the irrigation needs of the plant at a minimum expenditure.

Mulberry is a perennial, deep rooted crop and undergoes repeated harvesting and intensive cultural operations. Due to lack of sufficient irrigation during water stress period the metabolic activities of the plant reduces. Presently 2,16,734 ha. mulberry is under

**An integrated approach to optimum utilisation of water and appropriate irrigation method will not only help in saving the precious resource but also improving quality mulberry productivity, reveal the authors.**

irrigation in South India. Rainfall in the arid and semi-arid zones is very erratic and the prevailing drought conditions adversely affect mulberry leaf production.

Karnataka which has an annual rainfall of 500 - 700 mm, is a main centre for the production of cocoons. Water stress reduces



**Fig. 1. Method for measuring transpiration in potted mulberry plant.**  
ET: Evapo-transpiration, Es: Evaporation, Transpiration = ET-Es,  
Ew: Evaporation from water surface, W: Water, SC: Screw cock.

the mulberry leaf production and deteriorates the quality which affects the cocoon production. Under such conditions mulberry production is directly affected by the non-availability of irrigation. Hence, it is necessary to establish a system for the efficient use of water. The essential requirements of irrigation is to provide the appropriate amount of water to the mulberry crop at right time through uniform distribution system so that water is not wasted at all.

## Water management

Development of efficient water management system is very essential for economising the water use. The problem of water management can be solved by adopting the following ways.

- Determine the water require-

ment, i.e., when and how much to irrigate.

- Find out the adoption of irrigation for different soils.
- Adopt an efficient method of irrigation.
- Adopt some measurement for checking the loss of water and thereby increasing the irrigation efficiency.

## Water requirement

The water requirement includes the total amount of water for meeting the need of mulberry for the whole period of growth and calculated as :

Water requirement = Consumptive use + Application losses during the irrigation.

Consumptive use of water = Evaporation + Transpiration (Fig. 1).

The evapotranspiration of mulberry plant is 5-6 mm approximately per day. The consumptive use and loss of water during the irrigation has to be replenished by artificial application of water to the soil. The water requirement of mulberry sapling was estimated from 311 to 462, depending on the growth of mulberry plant. The minimum transpiration was found early in the morning and maximum during afternoon.

### When to irrigate ?

Frequency of irrigation totally depends on soil moisture tension (pf) which can be measured by an instrument called tensiometer. The soil moisture tension (pf) comes down to the field capacity at 1.5 pf. The available water for the plant is optimum when soil moisture tension is 2 to 3.5 pf. When soil moisture tension crosses beyond 3.5 pf, the garden must be irrigated immediately. Soil moisture tension is influenced by temperature and plant growth.

### Optimum irrigation depth

Soil texture is closely correlated with the depth of soil to be irrigated.

Textural classes	Irrigation depth (mm)
Sandy soil	25 - 50
Sandy loam soil	45 - 80
Loam	70 - 110
Clay loam	80 - 120
Heavy clay	100 - 140

Efficiency of field irrigation can be determined by measuring the quantity of irrigation water applied and stored in the root zone. The following broad values of irrigation efficiency may be observed.



**Fig. 2. Mulberry garden with sprinkler irrigation system**

Textural classes	Irrigation efficiency (%)
Sandy soil	60
Sandy loam soil	65
Loam	70
Clay loam	75
Heavy clay	80

### Efficient methods

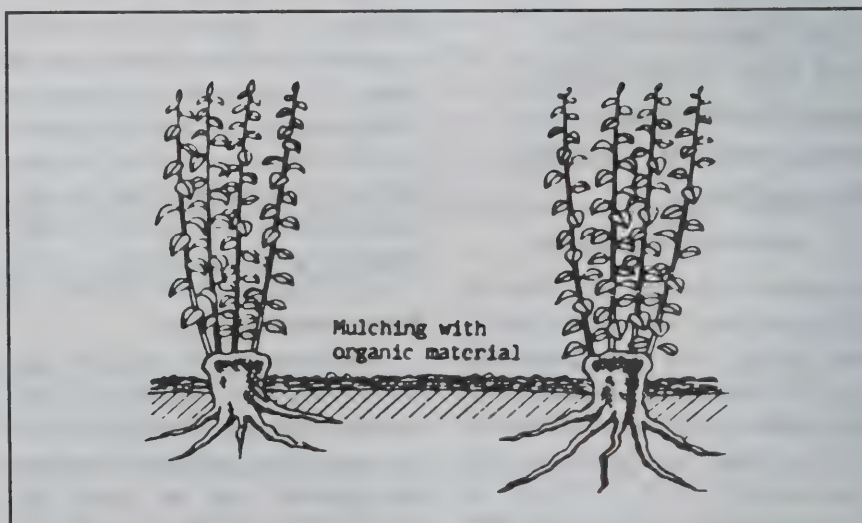
The leaf moisture content of 70% is ideal for healthy growth of late age silkworm. The requirement of irrigation water was found

to be 1.5 acre inch i.e. 34,000 gallons per acre per irrigation by ridges furrow method.

There are several methods of irrigation but compared to flood irrigation, furrow method, sprinkler and drip system are found to be economic in water saving especially under water stress conditions.

### Ridges and Furrow

This method is more efficient in water use. The field is laid out into a series of ridges and furrows. The basal part of furrows is made



**Fig. 3. Mulching with organic material**



wet by the flowing water and the ridge is moistened by the capillary movement of water.

### **Sprinkler**

The efficiency of this method is 80%. Sprinkler is installed at a spacing of 20 x 10 meter. The height of sprinkler is about 3 meters, water pressure 2.81 kg/cm and nozzle size 11 x 64" and 3 x 32" which covers 28 meters diameter land. It discharges about 28 meters of water per minute with the water level increasing by 8 mm per hour (Fig. 2).

### **Drip irrigation**

The drip irrigation method is suitable when the water source is limited. This method irrigates from drip nozzles (emitters, or drip holes made at a certain intervals of PVC pipes laid on the soil surface along a line of plants. Water is slowly and frequently dripped around the roots and is decompressed by several pressure reducing methods. The drip nozzles have a spiral fluid path in them and the partition tube has a porous orifice, both of which are decompressed when compressed water in the primary side passes through. In this method, only the drip points and nearby surface areas are wet which makes this system suitable for the smallest but frequent type of irrigation. The drip falls near the root zone which allows easy

nourishment control and the use of liquid fertilizer.

Generally the system operates on 0.5 – 2.00 kg/cm<sup>2</sup> of terminal pressure, using a decompressor and a filter to prevent clogging.

### **Advantages**

- An increased soil moisture around the drip points increases the leaf yield.
- Limited water supply to mulberry roots saves water.
- High moisture around main root zone means low salinity and less damage even with salt containing water.
- Low water rate in the pipe facilitates a uniform water supply.
- Saves mandays.
- About three times more land can be brought under cultivation using the same quantity of water. Since fertilizers directly reach the root zone in soluble liquid form, there is 30-40 % saving of fertilizers consumed. Since small amount of water is applied there is no risk of soil erosion.

### **Increasing irrigation efficiency**

Percolation loss: Percolation will occur when the amount of water entering the soil becomes greater than its water holding capacity. Percolation is the downward movement of free water and depended upon soil tex-

ture, structure soil compaction, amount of water cracking and it can be checked by limiting irrigation according to water holding capacity of the soil.

Seepage loss: Seepage is the lateral sub-surface movement of water. It is considered as loss when moves out of last bund of the field. Causes for seepage can be checked by constructing strong bunds and closing the hole or breach.

Evaporation loss: The factors which affect evapotranspiration losses are atmospheric condition, soil moisture content and plant age. Mulching of the soil surface can reduce evaporation loss (Fig. 3).

The use of chemical fertilizer should be avoided during water stress condition but organic manures can be used since farm yard and organic manures are known for their water retention capacity. During the summer season when the water source decreases the water can be collected in reservoir and used for irrigation. Middle pruning has to be done during water stress condition. The plant itself creates a big canopy which will check the evaporation of water from the soil and weed growth. Thus, an integrated approach will save the water and increase quality mulberry leaf production.

***The authors are with CSRTI, Mysore.***

## **QUESTION & ANSWER COLUMN**

You may be a student of sericulture or an academician; a sericulturist or a seri-extension worker; an importer or exporter of silk. And, you might have come across baffling situations that are different from the prescribed ones. And, you may be looking for a suitable reasoning. If so, Indian Silk will be the right choice.

Indian Silk intends to start a regular Question & Answer column. Your questions will be replied to by the subject specialists. Selected genuine curiosities and problems related to different aspects of sericulture and silk industry with answers will be published, every month.

***Mail your questions to : The Editor, Indian Silk.***

# 'Nursery-Guard': A Bio-fungicide for Nursery Management

V.P. Gupta

**M**ulberry plants are mainly raised through vegetative propagation. Being perennial in nature, its initial establishment through stem-cuttings plays a vital role in plant growth and leaf yield. Although suitable methods for mulberry plantation have been suggested, its initial establishment is greatly affected by many soilborne diseases, resulting in poor survival and establishment of plants in nurseries and fields as well. A survey indicated that more than 30% cuttings and saplings fail to survive only because of disease infection.

**'Nursery Guard' - developed by CSRTI, Mysore is an effective and economical bio-fungicide to protect mulberry nurseries against common diseases.**

## Nursery diseases and nature of damage

Stem-canker and die-back (*Botryodiplodia theobromae*), cutting rot (*Fusarium solani*), and collar rot (*Phoma sorghina* and *P. mororum*) are the major nursery diseases which cause severe mortality of cuttings and death of saplings, thereby affecting the establishment and ultimately mulberry cultivation. These diseases prevail throughout the year, how-

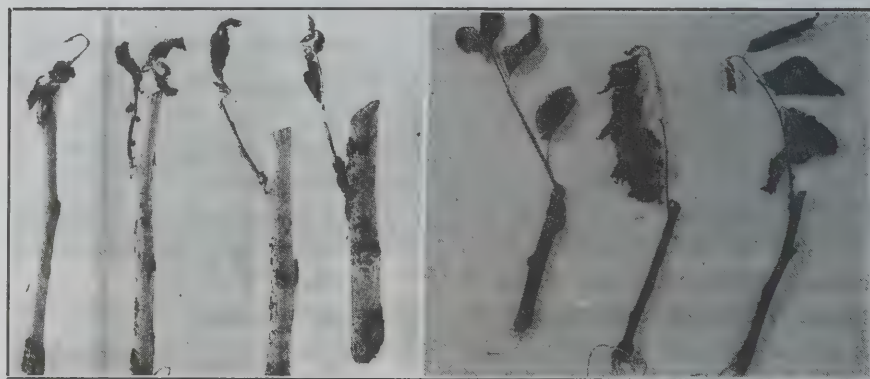


Fig. 1. Disease affected cuttings and saplings of mulberry

ever, their incidence is more during rainy and post-rainy seasons. These diseases affect almost all the mulberry varieties cultivated in South India. Due to disease infection, the bark of cuttings rots or decays leading to the failure of cuttings to sprout or even cause sudden death of the saplings (Fig. 1a & b).

## Disease management

**Development of biofungicide:** A biofungicide, Nursery-Guard (Fig. 2) has been formulated at Central Sericultural Research and Training Institute (CSRTI), Mysore which effectively controls such nursery diseases.

**Product Information:** Nursery-Guard has been developed using a native isolate of *Trichoderma pseudokoningii*. It is a lignite based, powdered form formulation having a shelf life of four months at room temperature and more than six months under refrigeration. Nursery-Guard can be used in integration with a compatible chemi-

cal fungicide, Dithane M-45 (Mancozeb 75% WP) at a very low concentration of 0.1% which further enhances the disease control efficiency. The product has to be commercialized. However, limited supply on cost basis can be made from CSRTI, Mysore, on request.

## Merits

- Cost-effective, eco-friendly and application-feasible.

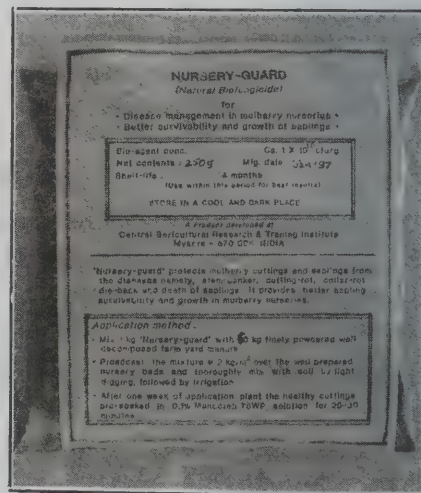
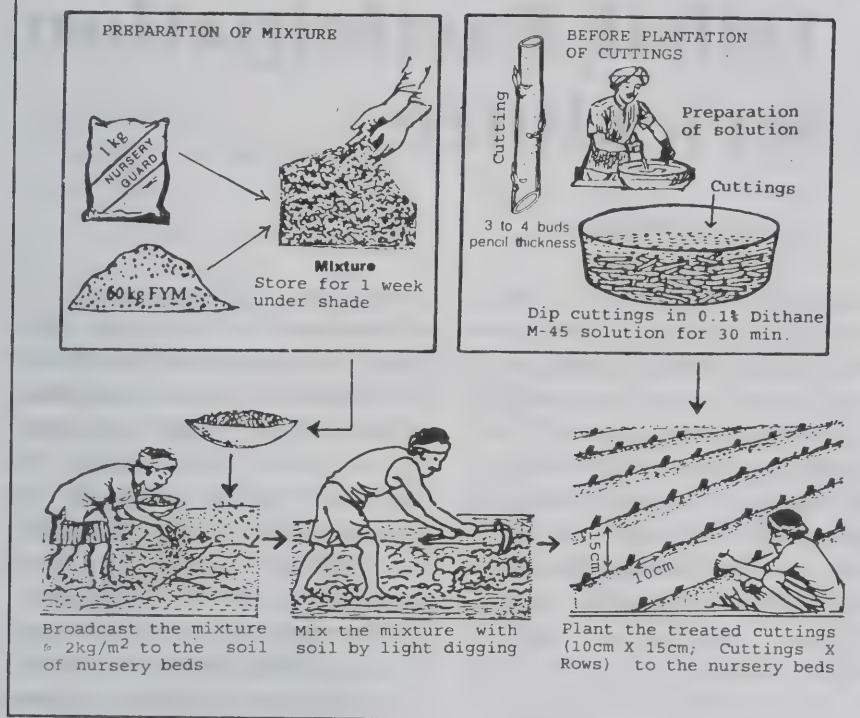


Fig. 2. Nursery-guard: Bio-fungicide



## APPLICATION OF NURSERY-GUARD



- Provides long term protection mulberry cuttings and saplings from the diseases, resulting in better sapling survivability and growth.
- Improves sapling health and vigour, thus ensures better establishment of mulberry plantation.
- Reduces the cost of sapling production or mulberry cultivation.
- No residual toxicity to silk-

worm and also the beneficial microflora of mulberry.

**Method of application:** Mix Nursery Guard with well decomposed finely powdered Farm Yard Manure (FYM) in a ratio of 1:60. Moisten the mixture (30% moisture) and store under shade for a week by covering with old gunny cloth or perforated polyethene sheet. Apply the mixture (0.2 kg/m<sup>2</sup>) to the soil of nursery beds, mix thoroughly by light digging,

and plant the cuttings pre-soaked in 0.1% Dithane M-45 solution for 30 minutes (Fig. 3).

## Important considerations

- Apply the mixture only in the planting area.
- Soak the cuttings in 0.1% Dithane M-45 solution immediately after preparation at least for 30 minutes.
- Level the land to avoid water logging.
- Do not apply FYM at the time of land preparation, use the same for mixture preparation.
- To avoid the drying of Nursery Guard, do not leave the mixture without mixing in the soil and planting cuttings, followed by irrigation.
- Plant the cuttings in upright position and do not apply any chemical fertilizer at the time of plantation.

## Trial results

The field trials reveal that by the application of Nursery Guard technology, disease control can be achieved by about 70% which enhances the sapling production by more than 40%, besides improving their health and vigour significantly.

**The author is with CSRTI, Srirampura, Mysore.**

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# Rajasthan : Tribal Participation in Sericulture

Shalini Mathur

**S**ericulture in the southern districts of Rajasthan has now been considered as one of the important rural cottage industries for providing gainful employment to the tribals, farmers and other weaker sections. In the last few years, the sericulture development programme has received good momentum and expanded manifold.

Today, sericulture is a flourishing industry in Rajasthan, covering mostly the tribal sub-plan

---

***Sericulture is a labour intensive agro-industry. Women contribute a lion share to this labour requirement, in addition to their house-hold activities. The study presents a comparison and account of the involvement of tribal men and women in sericulture.***

---

districts viz., Udaipur, Banswara, Dungarpur and Chittorgarh. There are thousands of families who have adopted sericulture as a subsidiary vocation in these districts.

## Methodology

The study was conducted in Panchayat Samiti, Girwa of

Udaipur district as it was one of the tribal panchayat samitis where the "Tribal Area Development Department" is implementing the sericulture development programme, since 1983-84. Out of six villages, two were randomly selected for the study. The sample consisted of 100 tribal farm women from sericulture adopted families. Interview technique was used for data collection.

## Tribal participation

The extent of participation of tribal women and men (as reported by women) in various activities of sericulture was measured with the help of the tool developed by the investigator for the purpose. In the tool, various activities of sericulture were divided into six broad areas and under each area a number of activities were enlisted.

To assess the amount of work done in sericulture by women and men, the data relating to participation of these groups in sericulture were quantified. The respondents were asked to perform the activities on 5-response categories, viz.

- Women only
- Men only
- Jointly and equally shared by women and men
- Jointly but greater share by women
- Jointly but greater share by men.

The maximum score given for

performing a single activity individually was 4. Two marks were given for activity performed jointly and equally by women and men, whereas three marks were given for an activity done jointly but there was greater share of the individual. One mark was given for activity done jointly but where share of the individual was less.

Mean percent scores were used to analyze the extent of participation of respondents in various activities of sericulture.

## Results and discussion

*Profile of the respondents:* All the respondents were having cultivation as their main occupation with 1-5 acres of land holdings. They had nuclear and medium sized families. Majority of them (97%) were of low socio-economic status.

*Work-share by women and men :* The participation of women and men in various components and overall work done by them in sericulture are presented in the Table. The Table reveals that the overall work done by women (57.26%) was more as compared to men (42.75%).

*Mulberry cultivation :* The participation of women and men was equal. Out of nine activities under this component, three activities viz., transplanting, leaf picking, hoeing and weeding were predominantly performed by women. The reason for the higher contribution of women, due to the



**Table : Component-wise share of work done by tribal women and men**

Components	Proportion of work (mean present scores)	
	Women	Men
Mulberry cultivation	49.97	50.03
Preparation of rearing house	30.75	69.25
Chawki rearing	50.00	50.00
Late age silk worm rearing	84.70	15.30
Post cocoon process	71.25	28.75
Equipment manufacturing	86.26	13.64
Overall work done	57.26	42.74

fact that these activities require bending while working and is easy for women.

**Nursery raising and irrigation :** Activities were equally shared by women and men. Contribution of women in land preparation and pruning was nil. While ploughing requires muscle power, pruning was considered to be a technical task and done by men. Similarly, the plant protection measures were predominantly carried out by men as handling chemicals and sprayers was considered to be more of a male's job.

**Preparation of rearing house:** Here, participation of women (30.75%) was less than men (69.25%). However, cleaning of rearing house was exclusively done by women. The other three activities namely making the rearing house light and air proof, preparing formalin solution and disinfection of the rearing room were predominantly done by men. The reason being that women had burden of household chores and agricultural operations. Besides, the task of handling chemicals was considered to be conveniently done

by men.

**Chawki rearing:** Under the component, the participation of both women and men was equal. All the activities of chawki rearing i.e., brushing, chopping mulberry leaves, feeding, cleaning and spacing of silkworm bed and placement of foam pads around the tray were equally shared by women and men. The reason being that only few families in the village were trained in this task and as each family had to rear large number of worms, the work load was much and hence all the adult members of the family participated in this activity.

**Late age silkworm rearing:** The participation of women (84.70%) was much higher than men (15.30%). Activities like pasting the bamboo basket with cow dung, cleaning and spacing of silkworm bed, spraying chemical on silkworm and feeding mulberry leaves were predominantly carried out by women, whereas the task of mounting the worms on chandrikes was equally shared by women and men. The reason attributed to the higher contribution

of women in late age silkworm rearing is that all these activities are indoor in nature, they do not require hard labour and technical skills but nurturing and delicate handling which can only be provided by women.

**Post-cocoon process:** In this sector too, the participation of women (71.25%) was higher than men (28.75%). Though the process involves a number of activities, the respondents were found to perform only two activities viz., harvesting the cocoon from chandrike and sorting the cocoons for sale. The reason for higher participation of women is that the work is monotonous, does not require any skill besides being an indoor activity.

**Sericulture equipment manufacturing:** Interestingly, the participation of women (86.64%) was more than men (13.64%) in this sector as it was an income generating activity providing additional employment.

## Conclusion

These findings clearly reveal that participation of women in sericulture activities was more in that are monotonous, areas demanding much time and attention, needing delicate handling, less technical in nature and are mainly indoors. Men participated in these activities either due to the reason that the work was technical or women had the burden of household chores and other agricultural operations.

**The author is a Ph.D. scholar in Rajasthan Agricultural University, Bikaner.**

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# Tasar Silk Industry in Vidarbha

G.S. Yadav, K.J. Reddy, G.C. Roy, B.M.K. Singh and B.R.R.P. Sinha

**T**asar culture is a traditional occupation of the aboriginals of Vidarbha in Maharashtra. The superiority of tasar silk as textile fibre has been in existence in folklore, and even today no other fabric can match its lustre and elegance. This provides the much

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**Vidarbha region of Maharashtra has a vast potential for development of tasar culture which is second only to mulberry. But the growth and development of the sector is at a snail's pace owing to various constraints. The authors discuss the ways and means to accelerate the growth of the industry with a view to tap its optimum potential for the weal of the inhabitants.**

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needed employment as this culture is largely suitable owing to the level of its economy and suitability for family and low paid rural labour.

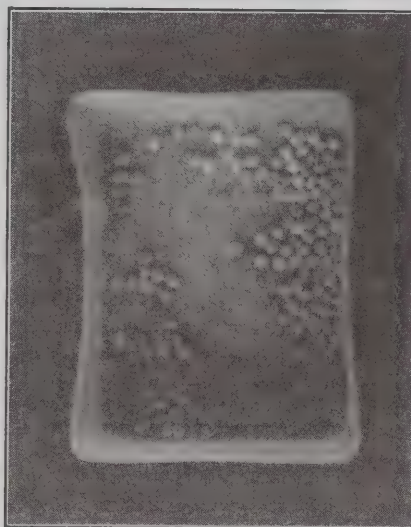


Fig. 1. Newly laid tasar silk worm eggs

## Tasar silk

Tasar silk is product of secretion from the silk gland of *Antheraea mylitta* Drury and

*Antheraea proylei* Jolly the tropical and temperate silkworms, respectively. The tasar silkworm thrives mainly on three food plants namely Yen (*Terminalia tomentosa* W & A), Anjan (*Terminalia arjuna* Bedd) and Sal (*Shorea robusta* Gaerrtn.) besides about 25 secondary food plants of different families. This culture has been associated with the tribals (Gond, Raj Gond, Bhil, Laman, Varali, Thakar, Katakare, Pradhan, Halva and Covera) since time immemorial and confer them a subsidiary occupation. Tasar culture is forest based industry warranting human activities for creation as well as conservation of forest. It confers ample job opportunities. It helps in maintenance of ecological balance, afford a

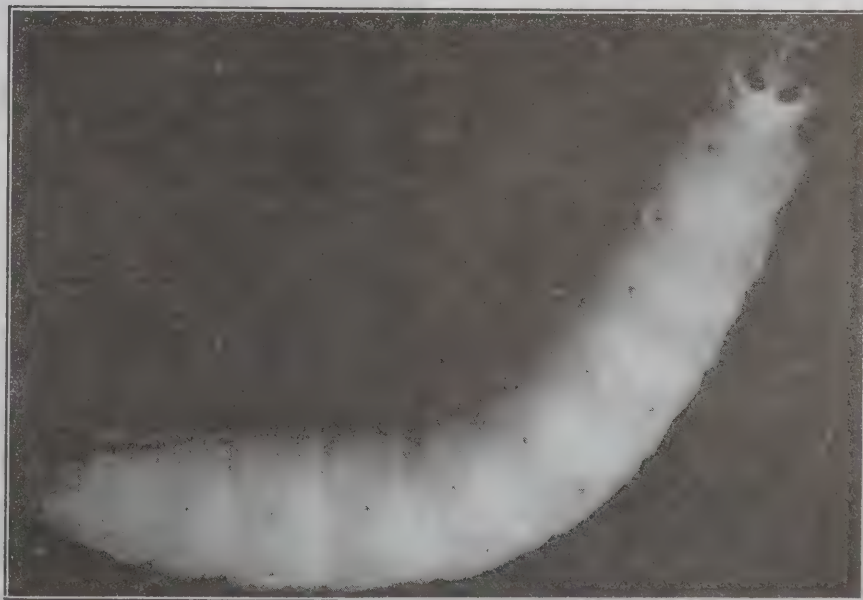


Fig. 2. Fifth instar tasar silkworm

Table 1. Families engaged in tropical tasar culture	
State	Number of Families
Bihar	60,000
Madhya Pradesh	20,000
Orissa	32,000
West Bengal	8,000
Andhra Pradesh	3,000
Maharashtra	3,300
Karnataka	2,000
Total	1,28,300

renewable source of timber, fire-wood, pasturage and items of minor forest produce. Besides, provides shelter and livelihood to adivasis and other inhabitants. It also controls severity of floods and checks soil erosion. Tasar food plants ensure moisture conservation and regulation.

In India, production of tasar silk stands next to mulberry silk, consisting about 6% of the total silk production. The main tropical tasar silk producing states are Bihar, Madhya Pradesh, Orissa, West Bengal, Andhra Pradesh, Maharashtra and Karnataka. Out of the total tribal population of 38 million, nearly 77% (30 million) is located in tasar cultivating states of tropical (25.67 million) and temperate (4.23 million) belts. About 1.28 lakh tribal families are engaged in tasar industry in tropical zone. The state-wise data of the families engaged in tropical tasar culture are adduced in Table 1.

The tasar culture in Maharashtra is by and large confined to Vidarbha region where the industry is developing slowly since time immemorial as a traditional craft; although it has tremendous potential as a commercial proposition in Bhandara, Chandrapur and Gadchiroli districts. The district-wise distribution of forest area of the Vidarbha region is adduced in Table 2.

The total forest area under the Vidarbha region is 31834.76 Km<sup>2</sup>

Table 2. Districtwise distribution of forest area in Vidarbha region (Year 1991-92)					
(Unit : Km <sup>2</sup> )					
(A) Amaravati Division					
1.	Buldhana	1057.31	92.61	—	1149.92
2.	Akola	783.52	15.27	—	798.79
3.	Amravati	3455.08	—	0.63	3455.71
4.	Yavatmal	2755.42	188.93	—	2944.35
	Total Amravati Division	8051.33	296.81	0.63	8348.77
(B) Nagpur Division					
1.	Wardha	527.88	319.03	—	846.91
2.	Nagpur	1416.81	822.76	—	2238.94
3.	Bhandara	21158.67	1065.15	—	3223.82
4.	Chandrapur	3473.04	929.52	—	4402.56
5.	Gadchiroli	3243.65	9530.11	—	12773.76
	Total Nagpur Division	10819.42	12666.57	—	23485.99
	Total Vidarbha Region	18870.75	12963.38	0.63	31834.76
	Total of Maharashtra	38278.28	14853.24	2348.15	55479.67
Source : Maharashtra Forests, A statistical outline (1993) current salient forest statistics					

against 55479.67 Km<sup>2</sup> of the total forest area in Maharashtra (57.38%). In total, 18870.75 Km<sup>2</sup> (59.27%) area comes under the reserved forest as against 12963.38 Km<sup>2</sup> (40.72%) protected forest. The area of the unclassified forest is still under the

revenue department of the districts which is known as Judapi jungle. The percentage of reserved forest (RF), protected forest (PF) and unclassified forest (UF) in the Vidarbha region against Maharashtra is 49.29%, 87.27% and 0.027%, respectively.



Fig. 3. Natural tasar cocoons of ecorace Bhandara  
1. Ber, 2. Dhawada, 3. Lendi and 4. Yen



**Table 3. Trend of tasar silk production in India**

Year	Tasar reeling cocoon (Kahan)	Tasar raw silk production (MT)	Tasar silk waste (MT)
1971-72 to 1975-76	254.4 ± 39.71 (C.V. % 15.60)	338.8 ± 49.48 (C.V. % 14.60)	150.8 ± 19.03 (C.V. % 12.61)
1976-77 to 1980-81	274.8 ± 28.09 (C.V. % 10.22)	361.4 ± 66.14 (C.V. % 18.30)	167.6 ± 38.86 (C.V. % 23.18)
1981-82 to 1985-86	397.8 ± 106.91 (C.V. % 26.87)	373.0 ± 85.70 (C.V. % 22.97)	130.2 ± 13.07 (C.V. % 10.03)
1986-87 to 1990-91	430.6 ± 48.34 (C.V. % 11.26)	463.6 ± 61.14 (C.V. % 13.18)	156.0 ± 15.86 (C.V. % 10.16)
Variation during two decades	SD ± 75.98 C.V. % 22.42	± 76.03 22.40	± 13.53 8.95

SD : Standard Deviation : (±), CV : Coefficient of Variation (%)

**Table 4. Number of sericultural villages (1989-90)**

State	Total No. of villages	No. of sericultural villages	Per cent to total
Maharashtra	41,833	1357	3.2
India	6,29,143	59,628	9.5

Besides, the Inter State Tasar Project (ISTP) for integrated development of tropical tasar and the efforts of CSB are worth mentioning which has conferred 1100 ha. of tasar plantation in the districts Bhandara (200 ha), Chandrapur (500 ha) and Gadchiroli (400 ha) of Vidarbha.

### Trend

The production of tasar raw silk in India during the last two decades has shown an increasing trend and the current production fluctuates around 463.6±61.14 MT. The record production of 484 MT was during the year 1990-91. There is fairly well increasing demand for the tasar silk owing to its strength, lustre and consumers affinity for the golden colour and other fascinating qualities as per the demand of the fashion of the day. However, the price of yarn and its escalation does not have any association with the variability of the production during last two decades which is 22.42% variability over the mean mid value of the two decades (Table 3).

### Price

Price of the yarn has gone up from Rs. 250 (1980-81, to 1500 (1996-97) a sharp increase of 500% within two decades. Apart from various economic aspects including exploitation by the middlemen, the price factor seems to have a definite influence on the existing unbalanced demand and supply position while the Govt. fixed price remains ineffective. Thus, the situation warrants immediate attention of all the agencies involved to arrest forthwith this unhealthy trend.

### Production of dfls

The production of disease free layings during the year 1990-91 was 3.11 lakh as against the total demand of 11.85 dfls in the Vidarbha region. It has supported the industry to produce only 0.20 lakh kahan of reeling cocoons, 3 MT of raw silk with 4 MT of silk waste.

Altogether, 150 tasar reeling machines, 10 silk waste spinning wheels and 225 handlooms were in function during the year 1989-90 in the tasar belts.

### Sericultural villages

Vidarbha region rather lags behind all the main tasar producing states inspite of having vast natural resources (Table 2). It is being practised only in 1357 villages which accounts for 3.2% of the total villages of India (Table 4). This culture has so far conferred 3284 families as a principal or subsidiary occupation and is prevalent among the aboriginals with a population structure of 9.8% scheduled caste, 1.3% scheduled tribes and 88.9% of other categories (Table 5).

### Tasar culture and Forest Conservation Act, 1980

The Forest Conservation Act, 1980 adjudicates the fact that "Tasar cultivation in forest areas by the tribals as a means of their livelihood without taking monoculture Asan or Arjun plantation shall be treated as forest activities. Therefore, no prior approval of the Central Govt. under the act is necessary (section 1.5 (II))".

The act confers the right that any tribal can take up the rearing by utilizing the tasar flora of forest on nominal revenue basis, whereas 89% of the population of the tasar belt in Maharashtra is of the other category. The problems of the rearers start in getting the forest patch on a nominal fee of Rs. 5/ha/annum to take up this culture and survive in tasar ecosystem applicable on the caste basis (Table 5) as the rearers do not have their own systematic plantation. This may be one of the reasons that tasar raw silk production could remain between 1232±1049 kg/year in the last three decades having coefficient of variation 40.80% in three decades (Table 6).

The act needs revision in the interest of the tasar culturists so as to allot the tasar flora for taking up rearing by non-tribals too for betterment of tasar culture as it is

**Table 5. Employment in sericulture in Maharashtra (1988-89 to 1989-90)** Unit : No of families

Category	1988-89	Per cent to total	1989-90	Per cent to total
SC	179	10.8	321	9.8
ST	61	3.7	43	1.3
Others	1418	85.5	2920	88.9
Total	1658	100.0	3284	100.0

eco-friendly and export-oriented. This can bring economic benefits to the tribals and non-tribals who are involved in this culture as aboriginals but not as scheduled tribes and hence conservation does not mean the sort of protection which prevents the utilization of natural resources rather it implies the wise use of natural resources on a sustained yield basis.

In spite of the multifarious problems, the industry has a tremendous scope and bright future in coming years if the problems of yesteryears can be solved by the tasar culturists. Thus, the industry needs

- Demonstration of improved methods of vegetative propagation techniques at farmers level. It further needs motivation for the adoption of the technique.
- Seed propagation should be avoided because genetic variability in the seeds merely

presents problems leading to segregation of the many morpho-variants of the Asan and Arjun plants. This further multiplies problems both for quality and quantity of tasar silk production due to poor food supply of the worms. In addition, seedling takes more gestation period in comparison to vegetatively propagated plant.

- Clonal propagation from the best suited food plants of Asan and Arjun should be a common practice taking different parameters of economic importance and same food plants should be multiplied at commercial level in the farmers field and also to the introduced in the new potential zones.
- In vitro propagation by auxiliary meristem culture will help clone them at commercial level of the best suited genotype.

- Systematic plantation of primary food plants having 4' x 4' spacing at farmer level or in the forest or in the waste land for its use specially with the basic principals of tasar culture in practice as the natural tasar flora presents multitudinous problems of managements of the silkworm as well as its food plants.

- Careful screening of the existing food plants population by application of morphometric analysis, studies on genetic variability to get the basis information on heritability, genetic advance of different traits before classifying them into different morphogenetic group and to isolate the best suited food plant for a specific zone, for race and crop.

- Conservation of eco-race Bhandara tasar silkworm which is lineally known as 'MULKI'. Ecorace Bhandara, one of the natural tasar ecoraces available in Maharashtra region is facing today the danger of extinction. In last 30 years the farmers have almost abandoned it for economic reasons. On the other hand, commercial exploitation of the natural population of the race by the tribals for their basic requirement has almost stopped its multiplication. All these have resulted in an eco-imbalance and calls for immediate conservation of the race.

This undomesticated race has better silk per cent (25.08) reelability and denier (10.20) with fairly durable silk. The ecorace Bhandara can be saved only if it can be taken into captivity at the rearers level to multiply it to get the gain in its population dynamics. An alternate way is to introduce the race in semi wild situation at their native land (Figs. 1 to 4).



**Fig. 4. Female moth of tasar eco-race Bhandara just after emergence**





Fig. 5. Pathological examination of the seed stocks of farmers

Table 6. Three decades of tasar silk industry in Bhandara and Chanda districts

Year	Tasar raw silk production (kg)	Coefficient of variation % during the decade
1961-62 to 1970-71	1232 (SD $\pm$ 245)	19.88
1971-72 to 1980-81	1000 (SD $\pm$ 100)	10.00
1981-82 to 1990-91	2571 (SD $\pm$ 1049)	40.80

SD  $\pm$  : Standard Deviation

- Success has been achieved to breed the ecorace Bhandara with alien races from the different habitats to introduce the race in semiwild form. Its breeding behaviour with commercially exploited races in the different combination of crosses is still under progress and performance of Bhandara X Sukinda has been found promising in the third crop having the gain in the economic traits (Tables 7 and 8). However, the natural population of this race is free from the pebrine disease – a chronic to the silkworms.
- An organised marketing system is to be introduced in the Bhandara, Gadchiroli and Chandrapur districts as the silk production of the districts is exploited by the middlemen and tasar culturists do not get remunerative return in most cases.
- The general strategy should be adopted for the development of tasar culture by improvement in the quality and quantity of the

Table 7. Breeding behaviour of ecorace Bhandara with ecorace Sukinda and performance of different quantitative traits of cocoons in the different combinations (Male)

Sex	Combinations (cm)	Peduncle Length (cm)	Peduncle Ring Cir. (cm)	Peduncle Ring Dia. (cm)	Peduncle Thick (O)	Angle of Peduncle (cm)	Cocoon Length (cm)	Cocoon Breadth (cm)	Longi. Cir. (cm)	Horz. Cir. (ml)	Volume (g)	Cocoon Weight (g)	Shell Weight %	Shell
M		a	a	a	a	a	a	a	a	a	a	a	a	a
	BxB	5.49 $\pm 1.27$	2.41 $\pm 0.14$	0.60 $\pm 0.04$	0.17 $\pm 0.01$	76.00 $\pm 1.66$	3.59 $\pm 0.05$	2.28 $\pm 0.04$	9.02 $\pm 0.09$	6.86 $\pm 0.09$	8.4 $\pm 0.37$	6.07 $\pm 0.15$	0.85 $\pm 0.05$	14.63 $\pm 0.45$
A	BxS	a	ac	ac	ab	a	bc	bc	bc	bc	bc	bc	bc	ac
		5.79 $\pm 1.14$	2.12 $\pm 0.27$	0.50 $\pm 0.08$	0.18 $\pm 0.007$	78.70 $\pm 1.42$	3.95 $\pm 0.067$	2.41 $\pm 0.03$	10.30 $\pm 0.12$	7.51 $\pm 0.11$	11.35 $\pm 0.38$	6.80 $\pm 0.23$	1.05 $\pm 0.03$	15.66 $\pm 0.39$
L	SxB	a	bcd	bcd	acd	a	acd	ade	ade	bde	bde	ade	ade	ade
		3.38 $\pm 0.26$	1.52 $\pm 0.13$	0.32 $\pm 0.02$	0.15 $\pm 0.001$	78.40 $\pm 3.38$	3.71 $\pm 0.03$	2.26 $\pm 0.02$	9.76 $\pm 0.04$	7.12 $\pm 0.05$	9.85 $\pm 0.18$	5.72 $\pm 0.14$	0.84 $\pm 0.04$	13.42 $\pm 0.31$
E	SxS	a	ace	ace	abc	a	bde	bdf	bdf	df	bdf	bdf	ade	bdf
		3.14 $\pm 0.18$	2.56 $\pm 0.09$	0.67 $\pm 0.04$	0.19 $\pm 0.09$	74.4 $\pm 1.53$	4.39 $\pm 0.04$	2.61 $\pm 0.02$	11.40 $\pm 0.11$	8.24 $\pm 0.09$	15.05 $\pm 0.49$	7.6 $\pm 0.13$	0.83 $\pm 0.09$	10.95 $\pm 0.52$

Any two means having a different letters are significantly different at the 5% level of a significance (df = 9).

B x B (Bhandara  $\bar{Q} \times$  Bhandara  $\bar{O}$ )      B x S (Bhandara  $\bar{Q} \times$  Sukinda  $\bar{O}$ )  
S x B (Sukinda  $\bar{Q} \times$  Bhandara  $\bar{O}$ )      S x S (Sukinda  $\bar{Q} \times$  Sukinda  $\bar{O}$ )

**Table 8. Breeding behaviour of ecorace Bhandara with ecorace Sukinda and performance of different quantitative traits of cocoons in the different combinations (Female)**

Sex	Combinations (cm)	Peduncle Length (cm)	Peduncle Ring Cir. (cm)	Peduncle Ring Dia. (cm)	Peduncle Thick (cm)	Angle of Peduncle (cm)	Cocoon Length (cm)	Cocoon Breadth (cm)	Longi. Cir. (cm)	Horz. Cir. (cm)	Volume (ml)	Cocoon Weight (g)	Shell Weight (g)	Shell %
F	BxB	a 3.87 ±0.13	a 2.77 ±0.10	a 0.64 ±0.03	a 0.205 ±0.01	a 72.90 ±1.58	a 4.03 ±0.04	a 2.49 ±0.02	a 10.29 ±0.10	a 7.76 ±0.06	a 12.45 ±0.16	a 7.92 ±0.22	a 1.20 ±0.08	a 14.77 ±0.69
E	BxS	bc 7.81 ±7.61	bc 2.12 ±0.27	bc 0.51 ±0.04	bc 0.20 ±0.007	bc 78.25 ±1.05	bc 4.35 ±0.03	ac 2.64 ±0.03	bc 11.13 ±0.08	bc 8.15 ±0.05	bc 14.91 ±0.24	bc 8.85 ±0.05	bc 1.35 ±0.005	ac 14.94 ±0.98
M	SxB	ade 3.92 ±0.48	bc 1.73 ±0.21	bc 0.40 ±0.05	a 0.17 ±0.02	ace 77.10 ±1.95	bce 4.28 ±0.03	ade 10.95 ±0.07	bce 10.95 ±0.07	ade 7.83 ±0.06	bde 13.43 ±0.29	ade 7.40 ±0.23	ade 1.05 ±0.08	ac 13.09 ±0.76
A	SxS	bfd 5.94 ±0.53	bc 1.98 ±0.08	bc 0.47 ±0.02	a 0.18 ±0.01	add 72.00 ±1.62	bdf 4.80 ±0.04	bdf 2.84 ±0.05	bdf 12.62 ±0.12	bdf 9.05 ±0.14	bdf 21.00 ±0.86	bdf 9.62 ±0.33	adf 1.06 ±0.04	bd 10.92 ±0.18

L

Any two means having a different letters are significantly different at the 5% level of a significance (df = 9).

E

seeds to fulfil the demand of the rearers which is to the tune of 11.85 lakh per annum as the state sector is unable to multiply at the rate of 7 to 10 times of the basic seeds provided by the two Basic Seed Centres of CSB functioning in the Bhandara and Chandrapur districts.

If multiplication at state sector is assured, this gap between the requirement and supply of seeds (dfils) can be minimised. A new Directorate of Sericulture has already been opened since April 1997 with its headquarters at

Nagpur and the expectation of the achieving the target is on the way.

- Quarantine measures should be introduced to control spread of diseases. Although, introduction of the act will have some temporary pause and difficulties to adopt it, it may be effective if the progressive farmers and Govt. agencies are determined for its adoption. Opening of Regional Disease Surveillance units at the level of RTRS by the CSB is an achievement in this field (Fig. 5).
- Demonstration of evolved pre

and post-cocoon research technology at farmers level by organising training, krishi mela, field day, vichar goshti etc. to transfer the finding of laboratory to the field (Fig. 6).

These improvements would boost tasar industry in the Vidarbha region.

**The first two authors are with Regional Tasar Research Station, Bhandara, Maharashtra and the rest with Central Tasar Research & Training Institute, Ranchi, Bihar.**

## India-Theme Pavilion at Heimtextil '98

'India-Theme Pavilion' – created and set up by the Design and Development Dept. of the National Institute of Fashion Technology (NIFT) at the Heimtextil '98 fair as a 'Partner Country' was the cynosure of all visitors.

The theme of the pavilion was 'Traditions from India' where 13 exclusive pieces of traditional crafts were displayed. 'Transition from Tradition to Modernity' was the main theme at the gallery.

The pavilion demonstrated the transition of India's fashion industry from its traditional roots to a highly motivated, design oriented, technically and globally competitive industry. The main highlight of the display was a gigantic having showing a panorama of Indian textiles, made in the form of a tree of life. The pavilion was visited by over 1000, many of them were designers from US and EU.

(Source : Colourage)



# Communication System in Sericulture Extension

B.K. Gupta and Y.K. Gupta

**T**he process of extension commences with communication. Communication is a driving force for developing mental phenomena, awareness, stimulating inquisitiveness, crystalizing decision and energizing action of the target group.

Extension visualizes communication as a process by which messages are transmitted from source to receiver. Various communication models had been developed and a simple one is presented in Figure-1.

## Communication structure

Different communication structures are utilized in extension. Usually, chain type of structure (Figure-2a) is followed at organisational level. The concept of delegation of mulberry flows down in the form of order.

However, for receiving quick information and rapid interactions certain communication networks are followed. Such communica-

tion structures may be wheel, circular and free flow (Figure-2b, 2c and 2d). The wheel network is similar to the formal structure of an organisation which the authority can communicate directly and separately with his subordinates.

In circular network each person can communicate with his neighbour only whereas in free flow or all channel method every one is allowed to communicate with other. This is followed during Extension Officers' Meeting (EOM).

## Communication system

With the progress of time various communication systems have been developed. Three levels of communication system in sericulture are in vogue.

- Dis-embodied,
- Media-embodied and
- Human-embodied communications.

These three levels of commu-

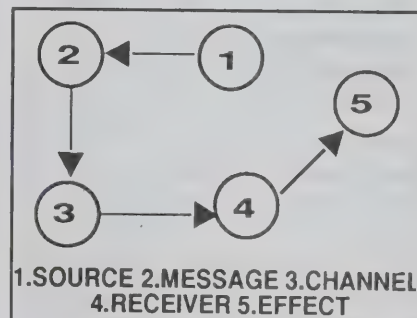
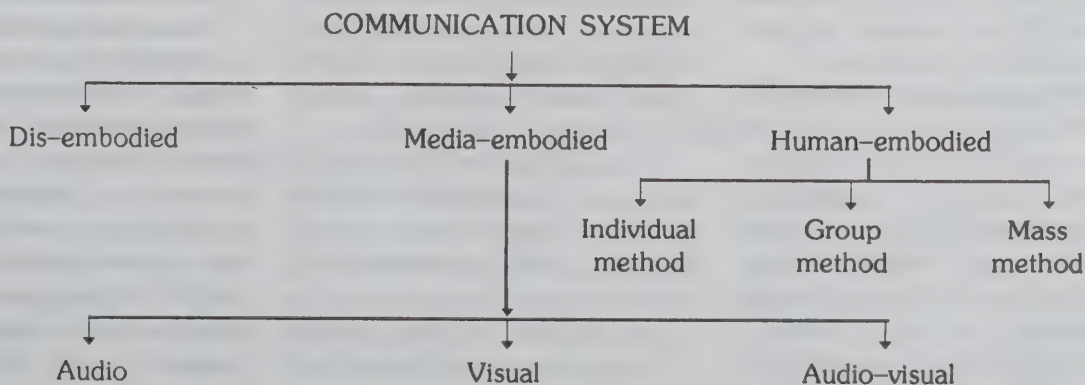


Fig. 1. Communication model

nication are again sub divided into different groups in sericulture extension and are presented in chart-1. All these communication systems are aimed to develop awareness among target group.

**Dis-embodied communication:** All written forms of communications i.e., handout, leaflets, bulletins, farm journals, news letters, news papers etc. are considered as dis-embodied communications. These are very much effective and preserved by the beneficiaries of sericulture. Such communications carry message

Chart 1. Different systems of communication



**Table 1. Facilities available through wireless media (numbers/100 persons)**

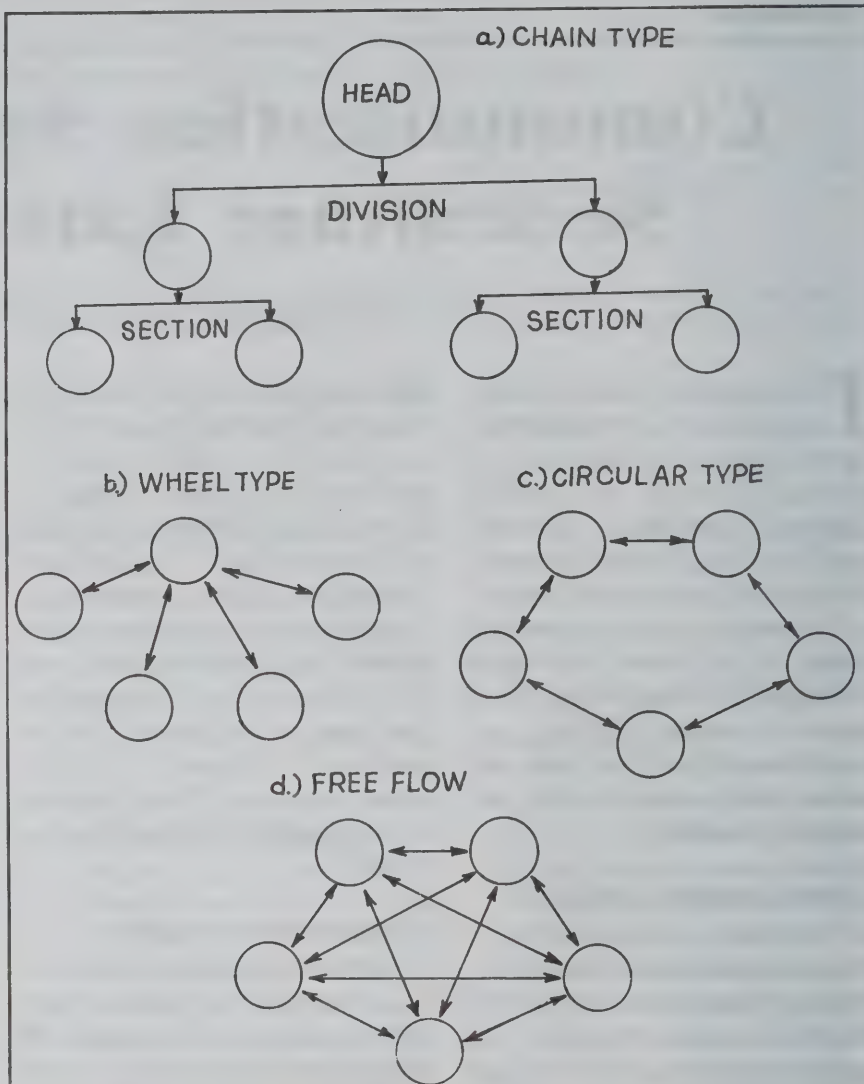
Name of the country	Radio	Television
India	08	05
Japan	91	84
Sweden	88	48
United States of America	212	79
Singapore	85	38
United Kingdom	114	45
Phillipines	14	12
China	18	23
Pakistan	09	02
Bangladesh	04	0.5

Source: Statistical Outline of India, 1995-96.

from source to masses. The leaflets, bulletins, news letters etc., published by research institutions or by the department of sericulture covers recommendations, technologies, package of practices of sericulture but do not reflect the views of beneficiaries viz. rearers, reelers, spinners, weavers etc.

Newspapers publish information relating to sericulture or silk industry. Rearers, extension workers and even research institutions find difficulty to develop rapport with the editors of newspapers. As a result, there occurs wide gap between editor and people engaged in silk industry. Now a days, farm journals are coming forward to transmit message from source to masses. Such farm journals may be encouraged so that they may act as a bridge between technology innovators and users.

**Media-embodied communication:** Media-embodied communications are facilitated through radio and television programmes such as 'Krishi Kathar Asar, Krishi Samachar' etc. These are very powerful communication media and covers vast areas within a short time. But the target group of sericulture may not have such fa-



**Fig. 2. Communication structure**

cilities. It has been reported that in India out of 100 persons, only eight have radio and five television set (Table 1).

Since sericulture is adopted by marginal and small farmers of developing and under-developed countries, media-embodied communications may not be useful to rearers, reelers, spinners, weavers etc., engaged in silk industry.

Communication through wireless media is perishable in nature and the effect may not last long. So use of audio-visual aids is encouraged in sericulture to communicate to the target groups.

**Human-embodied communication:** Personal contact, farm

visit, demonstration etc., fall under the category. This communication may be further classified into:

- Individual,
- Group and
- Mass methods.

**Individual method:** The extension workers individually contact people. Such frontline workers act as communicators. They visit mulberry garden and assess the requirement of disease free layings (dfis) prior to rearing. They also visit rearers under training and visit (T & V) programme and keep record of total numbers of rearers attended and their rearing progress. Thus, technology of



**Table 2. Impact of human-embodied communication**

Programme	Progress through years				
	1992-93	1993-94	1994-95	1995-96	1996-97
Farmers trained (no.)	466	341	257	202	316
Field day (no.)	204	105	155	92	72
Group discussions (no.)	242	159	102	145	183
Sericulture exhibitions (no.)	13	14	12	8	10
Farmers covered (no.)	1396	1570	1932	1427	1892
Mulberry plantation increased (Ac) (with HYV) in hundreds	15.67	17.49	19.03	20.31	21.16
Hybrid dfis (no.) reared (in lakh)	1.77	2.08	2.16	3.34	3.58

sericulture is directly implemented by field functionaries like Research Extension Centres (RECs), Technical Service Centres (TSCs) and Grainage cum Extension Centres (GECs) organised by the CSB as well as State Directorates of Sericulture.

**Group method:** In this method small groups of rearers, reelers, twisters, spinners, weavers etc., are communicated by frontline organisations of sericulture extension by way of organising field day, group discussion etc. The field functionaries communicate the benefits of high yielding mulberry varieties, silkworm hybrids and improved package of practices for mulberry cultivation and silkworm rearing.

**Mass method:** The programme like farmers' day, krishi mela, vichargosthis, exhibitions etc., are organised where a large number of rearers, reelers, spinners, weavers etc., are assembled. This programme provides scope to express their views about merits and demerits of improved materials and methods.

All these communication methods are implemented by sericulture extension to create effective situation in popularising sericulture and its related technologies. It is worth to mention that

involvement of farmers towards adoption of improved package of practices increases year after year (Table-2). Further, there is gradual increase in mulberry area with high yielding mulberry varieties at

farmers' level. It may not be out of place that rearing of hybrid dfis is also increasing year after year. Since the number of farmers covered by field units of sericulture extension of CSB is increasing continuously, communication, particularly, human-embodied communication plays important role from awareness level to adoption stages in sericulture extension.

It is to be added that the communication programmes like farmers' training, field day, group discussion and exhibition are very much essential to percolate evolved technologies to obtain sustainable cocoon crop.

**The authors are with Central Sericultural Research and Training Institute, Berhampore, West Bengal.**

## Unit Cost for Sericulture

The present unit cost for sericulture in Karnataka is as follows

Components	Amount (Rs.)	
Plantation of Mulberry per acre	6,000	
Equipments (for 1 acre of mulberry)	10,500	
Rearing house of 370 sq. ft. for 300 layings (for 1 acre and above)		
Mangalore tiles	47,000	
RCC roof	52,000	
Wells with pumpsets	47,000	
Private grainages	3,84,000	
Improved charakas (twin)	24,500	
Cottage basins (5 basin units)	1,30,000	
Multiend	5,00,000	
Twisting	5,99,000	
Handloom	1,19,000	
Powerloom	10,87,000	
Rearing house (shoot rearing system)		
RCC roof	2,46,000	
Mangalore tiles	1,80,000	
Drip irrigation system		
Spacing (m)	<u>Hectare</u>	
Row to row -0.61	0.40	25,700
Plant to plant -0.23	0.08	47,000
	1.00	62,500
Row to row 0.9	0.40	19,600
Plant to plant 0.9	0.80	34,900
	1.00	47,100

# Mysteries of Migration

**M**any organisms migrate for a variety of reasons. Some resort to it in search of food whereas others to escape from the vagaries of nature. In case of wild variety of tropical tasar silkmoth *Antheraea paphia*, migration is for attaining a sole goal i.e. reproduction. In Orissa, the wild species *A. paphia* is represented by two eco-races viz., the univoltine *Modal* and the bivoltine *Nalia* whereas the semi-domesticated species *A. mylitta* maintained and supplied by Central Silk Board, is represented by two eco-races *Daba* and *Sukinda*. The former is a bivoltine whereas the latter, a trivoltine.

In Orissa, both the eco-races of the wild tasar species *A. paphia* exhibit migratory activity. The male moths of these eco-races migrate for miles together in search of a mate whereas the female moths prefer to be stationary. Such a migratory activity is not observed in case of any eco-race of *A. mylitta*.

An experiment was conducted to vindicate migration in *A. paphia* by labelling male moths immediately after emergence. A few labelled specimen were found at a distance of more than 15 km. An amazing distance for such a defenceless delicate creature ! Nobody can ascertain where the labelled specimen could be found after migrating from the study site, as the migration takes place around midnight and no female moths were kept as a trap around the study site.

On the following day, reports were received about some of the

labelled specimens found at a distance of 15 km from the study site, where they were located by the tribal rearers. The labelled moths were seen to succeed in their flight for mating in the jungle.

Why migration is limited to the wild species alone and why *A. mylitta* does not exhibit such pre-nuptial flights?

The male moths were found to be highly active in comparison to the females. The observation may be explained by the fact that in case of male moths, purpose of life force drives or channelises metabolic energy to perform the only act i.e., to reproduce. Thus, the males have to be active while searching, finding and mating. The preference of female moths to avoid frequent movement vindicates the fact that they prefer to conserve the metabolic energy for oviposition. Also, female moths are heavier due to the bigger abdomen to carry eggs and hence, fail to fly.

The male moths of *A. mylitta*, though active, do not perform such pre-nuptial migration. The basic reason for such a differential activity may be due to its domestication, whereas *A. paphia* is completely wild and retain its wild character till date refusing domestication and indoor mating. Thus, preserving its migratory habit as a symbol of heritage to the wilderness and purity of the genepool.

**Report : K.B.G. Patro, ESS, Pottangi, Koraput and M.C. Dash, School of Life Sciences, Jyoti Vihar, Sambalpur, Orissa.**

## Book

### Handbook on Dyes and Pigments

The revised edition of "Handbook of Synthetic Dyes & Pigments", a comprehensive work containing information on synthetic dyes, intermediates and pigments has been recently released. Written by K.M. Shah, a notable technocrat having rich experience in the field, the book comprises three volumes, incorporating ideas, suggestions, processes, tables, applications, theories, formulae and reactions in regard to azo, acid, basic, disperse, vat, sulphur and reactive dyes.

The forepart of each chapter contains theory of the subjects in simple technical language. In addition, tables of commercial dyes, pigments and intermediates with their CI numbers, corresponding CAS number, constitution, manufacturing process etc., are also included. The book also contains chapters on environmental pollution and effluent treatment techniques, besides toxicity data on hazardous chemicals.

(Courtesy: Textile Express)



# Backward Linkage : A Strong Footwork for Success

Rajesh Kumar Sinha

**I**t was my fascination that decided my destiny. My fascination since decades for rich lush green mulberry leaves was the guiding factor in giving a shape to my career, tells Shri V.S. Krishna Murthy, owner-cum-manager of M/s. Lakshmi Silk Industries at Kolar Gold Field in Karnataka. Now known as one of the leading bivoltine silk reeler

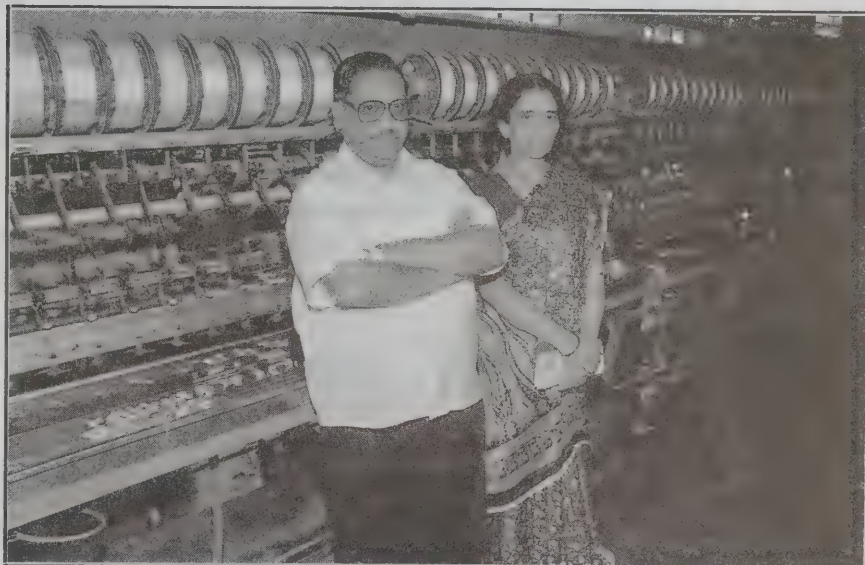
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**Aiming high with a firm conviction, Shri V.S. Krishna Murthy is a progressive bivoltine rearer cum reeler from Kolar Gold Field. Ensuring uninterrupted supply of quality bivoltine seeds would go a long way in the popularisation of bivoltine, he reveals to the Indian Silk.**

**Excerpts:**

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representing the area, Shri Krishna Murthy's reputation can well be understood in the light of the fact that the Central Silk Board under its Japan International Cooperation Agency (JICA) assisted programme, recently organised an "Enlightenment Programme on Bivoltine Reeling" at his premises, focusing him as a progressive



**Smt & Shri V.S. Krishna Murthy - Success through sericulture**

bivoltine reeler. The Central Silk Technological Research Institute, Bangalore has planned to adopt the unit as a model for technological upgradation.

A Bachelor of Engineering and also a Member of Industrial Engineers (M.I.E.), Shri Krishna Murthy, had been working in a foundry before becoming a sericulturist. "Sericulture did not fall my way, nor was it my family occupation. In a land holding of 1.5 acre, with no support, I got my farm ready to take up silkworm rearing. However, it took some more time for the "real take-off", he recalls.

Only after visiting during December 1995, the Sericulture Extension Officer (SEO) of Bangarpet was impressed with Shri Murthy's firm conviction and the infrastructure available with him

to take up sericulture. He immediately arranged for instant supply of mulberry cuttings. Those were the days full of enthusiasm to learn different aspects of silkworm rearing, accompanying the SEO to many a villages to have a close look at different practices of cultivation and rearing. The production of 74 kg cocoon/100 dfls with the M<sub>5</sub> mulberry variety encouraged him to perform still better.

With all this, only rearing could not keep Shri Krishna Murthy satisfied. Soon he started looking at related activities that might interest him. As he puts it, the weavers can be seen facing the problems of supply of quality silk. Hence, he decided to set up a reeling unit to make available the desired quality of raw silk. At this



stage, a neighbour joined him who wanted to invest in a remunerative enterprise and also had a son to employ. They planned for installation of 24 basin-CSTRI multiend reeling machine at the advice of the Karnataka State Sericulture Research and Training Institute (KSSRDI), Thalghattapura was done by M/s. Aryan Industries, Kanakapura.

The two partners ventured this establishment with investment of their own besides loans. "Unaware of any financial assistance being extended by the Central Silk Board towards the installation of the CSTRI Multiend reeling machine, we sometimes had to face the financial limitations," tells he.

With the conviction of achieving set exclusive goals at their own, they did not find it necessary to follow the practices adopted by other reeling units. However, at the outset, the importance of training to the workforce was realised. Hence, Shri Ramesh, the partner of the unit along with a batch of 24 employees - new on the rolls - was deputed to the KSSRDI for getting trained in different aspects of reeling.

As regards the production of cocoons, majority of the local farmers are still rearing cross breed for different reasons. However, the shift towards rearing of bivoltine is also noticeable. There is a great difference in the quality and lustre of silks reeled out of bivoltine and cross breed cocoons, hence the returns. This he could notice for himself as well. "Only in bivoltine, I could

### **Multiend Reeling : Subsidy cum loan scheme**

*In order to popularise the CSTRI multiend reeling technology different schemes have been launched from time to time. The present subsidy-cum-loan scheme introduced by the Government of India through the Central Silk Board attempts at the upgradation of the reeling technology in the country by extending financial support for the installation of multiend unit. The scheme emphasises mainly the upgradation of existing cottage basins besides promotion of new units. It offers a subsidy of 30% to be shared equally by the central and the state governments while the Central Silk Board advances 60% at no interest. The entrepreneur has to invest only 10%, initially. The scheme has been in effect since September 1997.*

get a net profit of Rs.200 per kg. of yarn produced" he tells proudly, "with almost same amount of labour and commensurating investment on purchase of bivoltine cocoons, the difference that can be achieved in net returns is really encouraging. But, the recommended care has to be ensured."

Now, he is a reeler known for quality bivoltine silk. At the same time, to keep his men and machine engaged round the year, he does go in for reeling of cross breed cocoons, occasionally.

The success did not come all that easy and it was the experience that moulded him into a

enterprising reeler. In the beginning, he was unaware of the importance of good reeling water in the production of quality silk and he had to face an embarrassing situation for their first marketing. His silk could fetch only Rs.1160 per kg while charkha silk was being sold at still higher rates. Today, his instant suggestion to the entrants to the reeling sector is to check the quality of reeling water as it has a direct relevance with the quality of raw silk.

Then, he aimed at marketing his products at Kanchi and Arni in Tamil Nadu where it was difficult to sell even a single gram of silk. The advantage of trading at Bangalore among others, is immediate cash payment



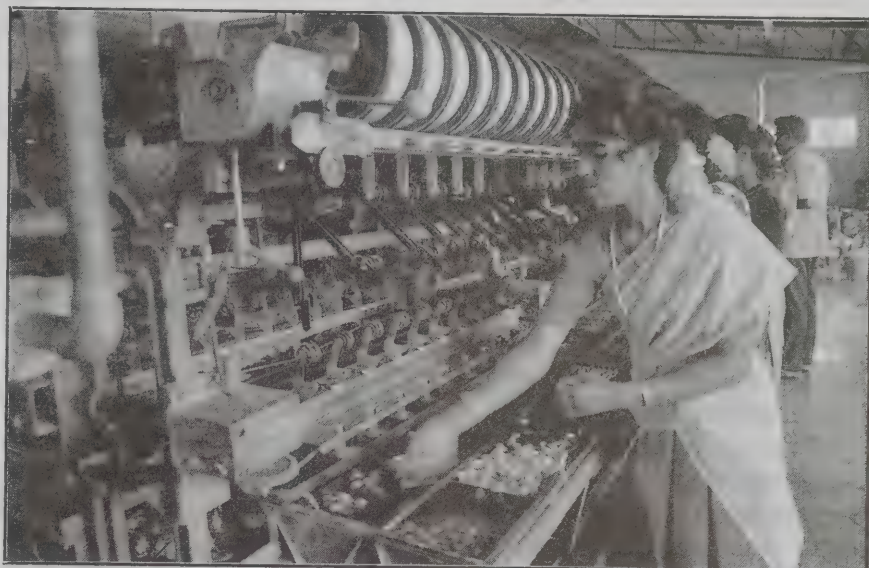
**Cocoon cooking - A hygienic process**



against a different system practised at Kanchipuram where the payment from the traders can be generally realised after six months, he opines.

Availability of labour is not a problem in the area with 3.9 lakh population. A large population is educated atleast upto SSLC but, are moving to the nearby cities even for a small income due to lack of suitable employment, locally. By providing them employment, Shri Krishna Murthy is attaining the dual goals of helping himself and the society.

Yet another important aspect of his achievement is, giving due recognition to the women force involved right from the production to the supervision and management. He has a reason to offer for his preference to employ lady workers in the age group of 18-21 years, in reeling — it is 100% attendance, sincerity with the assignment and immense patience. And, believe it, it pays them an incentive to the tune of Rs. 250-300. Shri Krishna Murthy follows a system where a reeler who maintains her attendance, uniform denier and evenness in the silk produced, would be able to



***Multiend reeling for quality***

gain points for which incentive is awarded. In the workplace only, one may find a board displaying the performance of the reelers in different aspects which certainly enthuse the poor performers for a better result, the next day. Workers have been provided with pick-up and drop facility from their residence. At least 40% of the workers who joined the unit in the beginning still continue.

To achieve quality raw silk, there are certain aspects to be considered; they are, quality of the cocoon, reeling water and ma-

chinery as also the skilled manpower. In today's conditions, while dependence on machinery for performing various assignments is on the increase, Shri Krishna Murthy still seems to hold high regards for the human involvement in achieving quality in silk, "This can be understood by the skill that is demanded of a person for silk reeling. At first, the cocoon lots are selected after ascertaining their quality. In India, this is done manually i.e., by touch. Also, gradation of the cocoons, ascertaining the filament thickness for feeding to get the desired denier, keeping a vigil on the number of cocoons being used at the running machine, require skill and sincerity."

"Maintenance of the uniformity in the desired denier is an aspect which is given due attention. Six samples from each basin per day are tested to ensure the uniformity", tells Ms. Sujatha S., B.Sc. (Sericulture), the Unit Supervisor who keeps a vigil on checking the denier, shell-ratio percentage etc. and ensures the quality of silk reeled.

In all, the quality of the bivoltine silk to produce quality silk fabrics,



***Waste is better utilised - Medlery charaka in operation***



is awarded at different stages of production, i.e., cocoon, reeling, twisting, weaving and weaving. As he has been able to derive remunerative prices for bivoltine silk reeled on CSTRI multiend reeling machine, he has a reason to encourage his neighbouring farmers to grow bivoltine cocoons that would fetch them better returns and enable quality reeling and a viable reeling activity for him.

The road to success is not always smooth. Hurdles and failures provide an opportunity to the entrepreneur to give a rethinking to his planning in achieving higher goals. Referring to the yield below the expected level in the last bivoltine cocoon crop, Shri Krishna Murthy has still to analyse the factors responsible. He has a target in mind to achieve the renditta and reelability from the crops at hand to the tune of 4.5-5 and 70-75%, respectively. Further, he has made to follow the recommendations at different stages.

He feels that the supply of bivoltine layings for the Kolar area is rather inadequate. Eager to take up bivoltine rearing on a large scale, Shri Krishnamurthy feels that the backward linkage in this regard would help in popularisation

of bivoltine rearing on a commercial scale. In addition to this, it requires the supervision by the technical personnel as bivoltine rearing is still new to many of the farmers, here. In this connection, the concerned authorities at the Central Silk Board maintain that supervision at different stages is a part of their regular work and they are rather happy to perform their jobs to their best.

On the introduction of newly authorised races, he tells, "I have reared traditional hybrids such as KAxNB<sub>4</sub>D<sub>2</sub> in the past but to my experience KA series yielded better results."

Shri Krishna Murthy is a regular participant in seminars and workshops being organised in different sectors of sericulture and silk industry. Silktech '94 was a great silk machinery extravaganza organised jointly by the Central Silk Board and the All India Silk Machinery Manufacturers Association, Bangalore drawing the participants from all over the country, offered an opportunity for the silkmen in different sectors, on a better understanding of the machineries available for the production of high quality silk. Shri Krishnamurthy recalls of attending

the machinery exposition through the KSSRDI, "However, we could not attempt at utilising the opportunity."

"If I could get required working capital, increased cost of production per unit would come down and I can pay off the loans early. But, it is difficult to get loans from the banks for the working capital, since banks seek a collateral of Rs.16 lakhs for a working capital of Rs.3.5 lakh" explains Shri Murthy.

For reeling silk from bivoltine and cross breed cocoons on multiend, he gets an incentive of Rs.100 and Rs.50, respectively which meets a part of interest on his loans. Besides, the silk spun on four medlery charkhas from the waste cocoons not only help waste utilisation but also add to his income.

Returns from marketing of his silk certainly varies but he could reach Rs. 1620 per kg which obviously is a remunerative price for his efforts. "Now, my per day production is 25-30 kg which needs to be increased to 40-45 kg. And, I am going to do this, soon", he beams with confidence.

***The author is with Indian Silk, Central Silk Board, Bangalore.***

## Indian Trade Exhibition in Baku

India Trade Promotion Organisation (ITPO) is organising the first ever 'Indian Trade Exhibition' at Baku, Azerbaijan from June 24-28, 1998.

The objective of the exhibition is to increase India's bilateral trade with Azerbaijan in particular and with other CIS countries in general by projecting the country's capacity to supply quality high-tech products and machinery.

The exhibition is expected to help the India trade and industry in economic interaction, identifying areas of mutual interest and tapping the full

marketing potential of Azerbaijan and neighbouring countries. Textiles, readymade garments and leather garments, interalia, other items, will be displayed at the event.

*For further details, contact*

India Trade Promotion  
Organisation,  
Pragati Maidan,  
New Delhi - 110 001  
Fax : 011-3318142/7896

*(Source : Silknet)*



# Printing of Silk : Reactive Dye Fixation Methods

D.P. Chattopadhyay and I. Bhadra

**P**rinting, a method of ornamentation employed first by ancient Indians and Egyptians, involves execution of the scattered or the all-over effect, either on a white or a coloured background of the fabric by direct, discharge or resist styles. It is done mostly on silks, the queen of textiles, which

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***Reactive dyes offer a wide range of bright shades and render good perspiration fastness in the case of silk printing. The authors elaborate the mechanism of reactive dye fixation with details of the various recipes and methods.***

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ranks highest among the natural fibres due to its lustre, soft feel, comfort, dignified drape, and aesthetic look. Many articles are produced from printed silk.

Silk has a good receptivity for a large number of dyes such as acid, metal complex, direct, azoic, indigo sol and vat dyes. But the demand for machine washable prints has kindled a new interest in the use of reactive dyes for printing silk. Reactive dyes offer a wide range of bright shades and give good perspiration fastness and are easy to discharge.

Silk in the grey state contains natural and adventitious impurities which impede the wetting property of the fabric. Silk's elaborate colouring process includes degumming, bleaching and optical whitening.

## **Chemistry in the use of reactive dyes on silk**

Most of the information related to the mechanism of reactive dye fixation on silk is mainly based on the dyeing experiments.

Balduvova, Korchagin and Koziona studied the effect of pH and temperature with DCT dyes and found that addition of sodium sulphate enhances the dyed fixation considerably. The maximum sorption and fixation was achieved by dyeing for one hour at 70°C at pH 5.6 with 4 gpl  $\text{Na}_2\text{SO}_4$ .

MCT dyes involve a problem of low reactivity which can be increased by using tertiary amines which form quaternary ammonium salts with dyes like 1, 4 diazo, 2, 2 bicyclo octane (DABCO).

VS dyes react by nucleophilic addition mechanism, but can also react by nucleophilic substitution mechanism. Shimuzer and co-workers studied the effect of pH on percentage fixation of remazol dyes and observed that maximum fixation occurred at pH 7-8.

Dohmyo and his co-workers expected that remazol dyes get converted to vinyl sulphone form and hydroxy ethyl sulphone forms under alkaline conditions.

This VS form then reacts with silk by nucleophilic addition mechanism. By comparing the percentage exhaustion of VS and acid dyes dyed on silk at 60°C for 24 hours at different pH (3-11), they showed that VS dyes sorption is independent of the number of protonated amino groups of silk.

N. Lakkume and Dr. Apita Sundaram showed the maximum exhaustion was shown by VS dyes among M.H, HE and VS dyes when the dyeing was carried out for 2 hours at RT.

Reactive dyes like difluorochloro pyrimidyl (Verofix, Drimarene F) L-bromo acrylamide (Lanasol) etc can also be used for dyeing of silk. Xia studied dyeing of silk with difluorochloro pyrimidyl dyes and showed that the tyrosine residues of fibres play an important role in the bifunctional reaction with the dye. Ball, Meyer and Zollinger classified dyes on the basis of the solubility of silk after dyeing and stated that bromo acrylamide dyes undergo bifunctional reactions to a limited extension only.

Kato reported that difluorochloro pyrimidyl dyes in alcohol/water mixture when, used in tasar silk fabric, the amount of surface dyeing decreased with an increasing alcohol content.

Dalamatov and Umarora have reported that the reactive dyes on silk inhibit the UV- irradiation and photo-chemical degradation of natural silk.

The wet fastness of the dyed silk is dependent on the dye-fibre bond stability. The dye fibre bond is largely dependent on the pH. The stability of reactive dyed silk lies between that of wool and cotton. In another study, which investigated the dye-fibre bond stabilities of a variety of dyes with different reactive groups, indicated that the dye-fibre bond is sufficiently resistant to hydrolysis in pH range 1.89 to 10.65 at 70°C for 24 hours.

### Printing by direct style

Due to relatively small amounts of functional groups in silk fibroin, an alkaline printe paste is necessary to get high fixation ratio. Various practical methods of printing silk with various reactive dyes are as follows.

### Printing with procion dyes (ICI)

Recipe	
procion H dye	= 2 parts
Urea	= 100 parts
Manutex F (10% paste)	= 500 parts
Matexil P-AL	= 30 parts
Matexil WA-KBN	= 20 parts
Sodium bicarbonate	= 25 parts
	1000 parts

### Process

Print-Dry-Steam under atmospheric conditions at 102°C for 10-15 minutes - washing.

### Steps in washing

- Cold rinse.
- Rinse for 5 minutes in water at 60°C.
- Treat for 10 minutes at 85°C in a solution containing 2 gpl Lenatol B, a non-ionic detergent and 1 gpl soda ash.
- Rinse in a solution containing 2 gpl metaxil PC-PN, a cationic fixing agent, acidified with acetic acid.
- Dry fabric without further rinsing.

### Printing with Drimarene dyes (Sandoz)

Dyes suitable for printing silk includes Dimarene R, Drimarene K, Drimalal F and Drimarene P dyes.

Recipe	
Drimarene R, K, P or Drimarene F dye	= 2 parts
Urea	= 100 parts
Revatol S	= 10 parts
Sodium bicarbonate (R,K, F Dyes)	= 8-10 parts
Sodium bicarbonate (for P dyes)	= 15 parts
Thickener	= Y parts
Water	= Z parts
	1000 parts

*Note : Drimarene Turquoise R-BL should be printed without alkali.*

### Process

Print-Dry-Steam at 120°C for 10-20 minutes (for R, K & F dyes) and 20 minutes (for P dyes) - washing (as discussed earlier).

Generally, alginate is used for thickening. But when sharply defined effects are required, guar gum may be used. The handle of fabric can be improved by replacing  $\text{NaHCO}_3$  with 35 g/kg  $\text{CH}_3\text{COONa}$ .

Soda ash can be used along with sodium bicarbonate for Drimarene P dyes. With these dyes, complete fixation is not achieved giving lower wet fastness properties. This can be improved by a treatment with a cationic dye fixing agent (Sandifix TPS liquid/ Sandofix WE liquid).

### Dry heat fixation method

Recipe	
Dye	= 9 parts
Water	= 10 parts
Sodium bicarbonate	= 15 parts
Urea	= 15 parts
Thickener (6% alginate)	= 64 parts
	100 parts

### Process

Print-Dry-Cure at 150°C by

dry heat for 5 min-Cold rinse - Soap at boil for 5 min.

### Another recipe for printing is

Recipe	
Cibacron dye	= 30 parts
Urea	= 100 parts
Albatex BD/Ludigol	= 10 parts
Water	= 230 parts
Emubion thickening	= 600 parts
Sodium bicarbonate	= 30 parts
	1000 parts

Emubion thickening contains	
Diphasol EV (12.5%) emubifier	= 50 parts
Water	= 150 parts
White spiriting	= 400 parts
Low alginate (12% paste)	= 400 parts
	1000 parts

### Process

Print-Dry-Steam for 10-15 minutes at 100-102°C - Rinse with cold water and hot water at 60°C - Treat with 2 ml put  $\text{NH}_3$  (25%) of 60°C - in cold water 1 ml./Lt.  $\text{HCOOH}$  (85%) - Dry.

### Another recipe for printing

Recipe	
Procilan dye	= 30 parts
Urea	= 50 parts
Boiling water	= 395 parts
Add this to thickener	= 500 parts
Permal KB	= 10 parts
Sodium Bicarbonate	= 15 parts
	1000 parts

*Note : Procion Black RS is not recommended for natural silk, Thickners used include Indalco V and Macyprogum AC.*

Krynckova investigated the pad-batch and steaming methods for fixation of dichlorotriazine and VS dyes and found that optimum dye fixation was obtained in 5 hours at pH 8 for DCT dyes and 6 hours at pH 11.3 for VS dyes in pad-batch technique, followed by steaming at 102-104°C for 4-5 min.



## Discharge printing of silk under reactive dyes

Since the chromophoric part of the reactive dye is derived from acid dyes, those dyes, having azo group are dischargeable. Many reactive dyes belonging to Ramazol, Drimalan F, Drimarene and Hevafi E dye are suitable for discharge printing of silk.

Various reducing agents suitable for discharge printing of silk include salts of suphonylate, stannous chloride, zinc dust with sodium bisulphate and thiourea dioxide.

A major problem in printing silk with discharge style is in obtaining good contrast on white discharge printed regions. Prinlofix white DH<sup>2</sup> can be used to tone down the natural brilliancy, but this gives a dull effect.

### A typical recipe

Discharge resistant	=	X parts
Diethylene glycol	=	10-30 parts
Reducing agent	=	30-150 parts
Thickener	=	500-600 parts
Stability improvement agent	=	0-20 parts
(sodium chlorate)		
Water	=	rest
		1000 parts

## Process

Print-dry at 100-110°C – steam at 102-104°C for 10-30 min.

## Recent developments

The majority of printing faults can be ascribed to the steaming conditions of prints. Recently, a new technique involving fixation of reactive prints on silk by sodium silicate pad-batch technique has been developed.

The method involves printing silk with a print paste containing dye = (4 parts), water = (10 parts) and thickener = (86 parts), followed by padding with sodium silicate solution of 91.5° TW batching at R-T and finally soap-ing at boil for 5 min.

It was found that prints obtained had very good light and wash fastness, machine washable qualities and a little loss in the tensile strength of fabric due to combined effect of sodium silicate and dye. It was observed that amino groups and tyrosine-2 hydroxyl groups present in silk are involved in the reaction with dye under this method of fixation.

In order to find dyes suitable for this method, Chavan and Nalankilli carried out work with Remazol Red C2G, Procion Red H8B and Procion Red M8B. They found that the optimum batching time and fixation for these dyes was 3 hours and 69%, 30 hours and 71% and 14 hours and 79% respectively. They reported that remazol dyes required the least batching time, the maximum amount of dye being fixed within one hour, after which it increases steadily upto three hours batching time. It was also reported that the optimum batching time is dependent on the reactive group in the dye.

A group of scientists under Pickhadze showed that the use of dichloro pyridyl and bromo acrylamide reactive dyes eliminated the need to steam the printed fabrics, the optimum fixing temperature for these dyes being 100-130°C.

*The authors are with the Technological Institute of Textile and Sciences, Bhiwani, Haryana. (Reproduced with permission from the Indian Textile Journal, September '97 issue).*

## A Touch of Silk, month after month, throughout the year

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# Sericulture Needs More Credit

**A** two day national workshop on *Assistance to Sericulture* was organised by the Central Silk Board, Bangalore on 28-29, January, 1998 at Silkworm Seed Technology Laboratory, Kodathi, Bangalore. It was another occasion to witness grueling deliberations. In fact, it came in the right time, as the industry and the policy makers were expressing concern over the slow inflow of the credit, hindering the developmental process. It was appropriate because of the stress being laid on the vertical growth of the industry, and any qualitative improvement would mean additional investment.

Inaugurating the workshop, Shri H. Ekanthaiah, Chairman, Central Silk Board said that it is an attempt to bring together various agencies extending financial assistance and also the users to a common platform to discuss the issues relating to the assistance. Discussing the various activities and processes of the industry that need regular input/investment to improve their productivity and vi-

ability, he stressed the need for regular and timely inflow of credit from the financial institutions for sustained growth. Expressing concern over the sluggish inflow of the credit to sericulture, he suggested for integration of credit flow from financial institutions with other forms of assistance schemes from state and central agencies to enhance the overall effectiveness of the assistance.

The workshop was well attended by nearly 70 participants representing key agencies like Central Silk Board, State sericulture departments, NABARD, SIDBI, commercial banks and from the user segments like seed producers, farmers, reelers, machinery manufacturers etc. The workshop was divided into four sessions viz.,

1. Direct Assistance to Sericulturists in traditional states,
2. Direct Assistance to Sericulturists in non-traditional states
3. Assistance lines available and modalities and
4. Assistance for quality

upgradation - On Farm and Non-Farm

In all, about 12 papers were presented which gave a detailed account of the status, problems and the needs of credit to the industry in various states. Two days marathon deliberation on various issues were finally made to pass through three identified working groups which in turn enlisted specific problems and recommended possible remedies. The recommendations were quite laudable as they would have far reaching effects on improving the credit flow to the industry. Some of them are :

- Increased assistance for mechanised cultivation, maintenance of mulberry garden, purchase of various equipments and inputs, construction of rearing room or house etc.
- Periodical revision of unit cost based on market rates and introduction of Farmers credit card to facilitate easy availability of loans.
- Introduction of uniform credit policy for sericulture at the national level to overcome the present differences in the assistance available from state to state.
- Increased term loan facility and working capital and immediate release of subsidy to the beneficiary.
- Periodical review of bank credit performance at state and national levels.

Lauding the recommendations made by the workshop, Shri Y.C. Nanda, Executive Director of NABARD assured of the all the cooperation from NABARD to increase the credit flow to



*Shri H. Ekanthaiah, Chairman, CSB, inaugurating the workshop*





**Shri Y.C. Nanda, Executive Director, NABARD, releasing the CSTRI textile design booklet - Peethambar Perceptions**

General Manager, NABARD, Bangalore clarified that the unit cost for sericulture is only an indicative cost derived to help the bankers to finance. Shri A.N. Nayak, Deputy General Manager, Canara Bank said that his bank being the lead bank in the state, is extending assistance to sericulture to the tune of ten crores. Shri A.B. Agawane, Commissioner of Sericulture, GOK summed up the deliberations and suggested for increased credit share for sericulture in District Credit Plans and Potential Credit Plans of the financial institutions.

During the plenary session, the Executive Director of NABARD also released 'Peethambar Perceptions' - a textile design booklet from the Central Silk Technological Research Institute, Bangalore.

**Report : M.N. Ramesha, Editor, Indian Silk.**

sericulture. He felt that in comparison to the total volume of transaction in sericulture sector, the credit support is very negligible. He called upon the sericulture agencies to put forth their views in the district and state level

bankers committees for speedy implementation. Chairman, Central Silk Board stressed on the need to have a uniform policy on the matter to ensure adequate and timely credit support to the industry. Shri V. Srinivasan, Chief

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## Member Secretary visits Aurangabad



*Shri Arun Ramanathan, IAS, Member Secretary, CSB, visiting the paired row mulberry plantation*

Shri Arun Ramanathan, IAS, Member Secretary, Central Silk Board, visited sericultural villages of Vahegaon and Goltgaon of

Aurangabad areas, on 18th December, 1997. He was taken a round of low cost rearing houses prepared out of bajara kadbbi and

paired row system of mulberry plantation. He appreciated low cost rearing technology adopted by poor and marginal farmers. He was very much satisfied with the implementation of sericulture programme under drought condition, with meagre investment. The Member Secretary advised the farmers to make maximum use of organic manure to harvest good quality cocoons. He was accompanied by Shri N.G. Kamadi, Director of Sericulture, senior officers of the state department and Shri J.F. Pahurkar, Jt. Secretary (Tech), CSB, Bombay. Shri A.D. Jadhav, Assistant Director of Sericulture, Aurangabad, explained the work done in the areas.

**Report : A.D. Jadhav, Asst. Director (Seri.), Aurangabad, Maharashtra.**

## Farmers' Day on Multivoltine



*A sericulturist sharing his experiences*

A one-day Farmers' Day on 'Multivoltine Seed Area' was organised by Seed Cocoon Procurement Centre, Denkanikottai, Dharmapuri district, Tamil Nadu

at Denkanikottai on December 22, 1997.

The programme was presided over by Dr. T. Pavan Kumar, Director, NSSP, CSB, Bangalore.

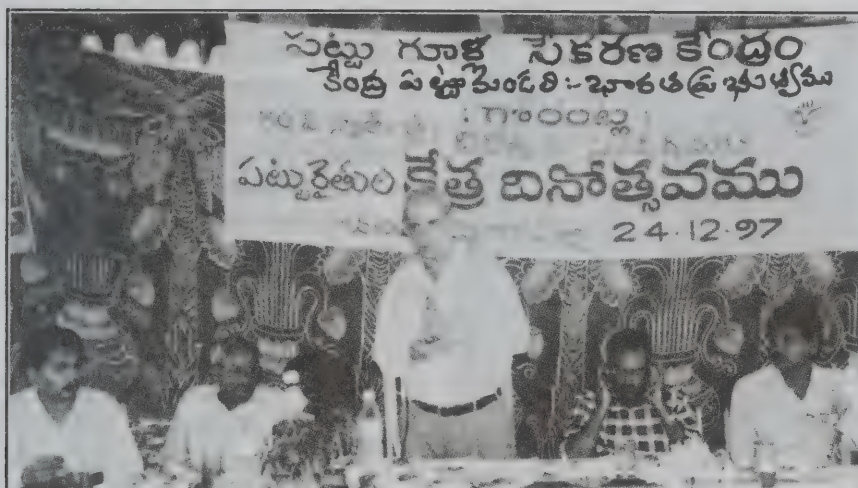
Shri M.M. Baig, Dy. Director, NSSP, Bangalore talked on care to be taken in handling silkworm eggs. Shri Jaishankar, Dy. Director, SSPC, Hosur explained the importance of disinfection in seed areas. Shri J. Kodandaramaiah, Asst. Director, P2 BSF, NSSP, Krishnagiri, explained the management of mulberry garden. The Assistant Director of Sericulture, Denkanikottai narrated chawki rearing methods.

Shri Jayant Jayaswal, Joint Director, ZSSPO, Bangalore distributed cheques to the seed rearers. The Director, NSSP distributed prizes to the progressive seed rearers. Over 200 seed rearers including women took part in the programme.

**Report : S. Rajkumar, Asst. Director, SCPC, Denkanikottai, Dharmapuri dist, Tamil Nadu.**



## Field Day on Seed Cocoon



*Dr. T. Pavan Kumar, Director, NSSP speaking on the occasion*

As a part of the 50th year of Independence, a one-day 'Field Programme on the Importance of Seed Cocoon' was organised by the Seed Cocoon Procurement Centre (SCPC), Gorantla, NSSP, Central Silk Board at Chalamaharipalli, Anantpur district on 24th December, 1997.

Dr. T. Pavan Kumar, Director, National Silkworm Seed Project (NSSP), Bangalore presided and explained the role of the SCPC in producing disease free multivoltine cocoons.

Shri Ch. Sathyanarayana Raju, Assistant Director, SCPC, Gorantla outlined the objectives of the pro-

gramme.

The main themes discussed by the scientists of the Central Silk Board during the programme included rearing of multivoltine silkworms – diseases and control measures; importance of Mysore seed cocoon and its impact on preparation of cross breed layings and the role of organic and inorganic fertilizers in mulberry cultivation.

The loan facilities, incentives and the rearers' problems in multivoltine seed area were briefed by the officers of the Department of Sericulture, Andhra Pradesh.

An interpersonal session was also organised in which subject experts answered the questions on mulberry cultivation and silkworm rearing. About 150 rearers from 17 villages took part in the programme.

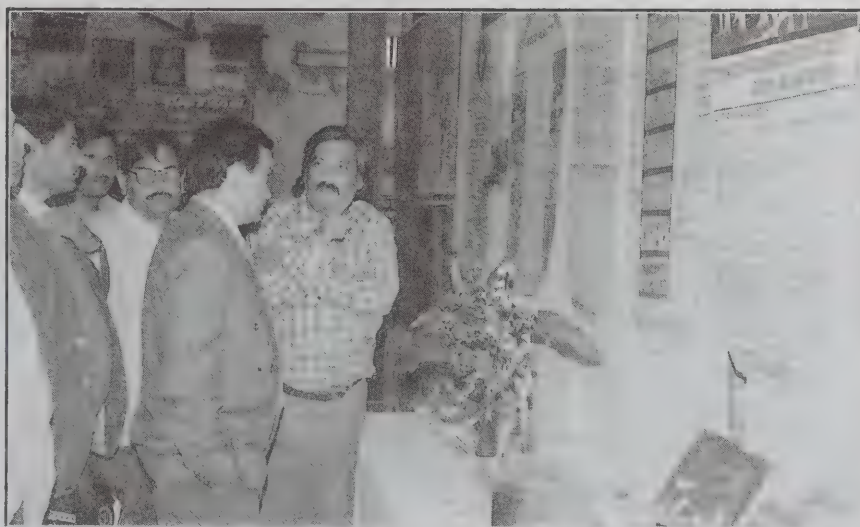
**Report: Ch. Sathyanarayana Raju, Asst. Director, SCPC, Gorantla, Anantapur District, Andhra Pradesh.**

As a part of celebrating the golden jubilee of independence, a Field Day on Tasar Culture was organised by the Research Extension Centre, CTR&TI, CSB, Katghora, Bilaspur district, Madhya Pradesh on December 26, 1997.

Dr. J.K. Upadhyay, IFS, Conservator of Forest, Bilaspur inaugurated. He said that 'Forest Conservation Societies' are actively associated with tasar culture and nearly 1200 beneficiaries have undertaken rearing. Shri V.K. Sinha, IFS, Divisional Forest Officer, Korba, participated as special guest and stressed the need for enhancing the prices of cocoons, crop insurance scheme, expanding extension network and a device for harvesting nature grown cocoons.

The event's added attractions were technical session and interaction with progressive farmers for evaluating the technology percola-

## Field Day on Tasar Culture



*Guests being briefed on the theme*

tion and formulating strategy. A committee of experts has also made recommendations and conclusions on a transfer of technologies on Asan seedling, foliar application of urea, fertilizer application to tasar food

plants, integrated rearing and virus control. Fifty six progressive farmers attended the programme besides officials from CSB and DOS.

**Report : S.K. Tiwari, Asst. Director, CTR&TI, REC, Katghora, M.P.**



## Farmers' Vichar Goshthi



**Dr. A.R. Trag, Director, SSDD, J&K releasing the technology pamphlets**

A Farmers' Vichar Goshthi was organised by Research Extension Centre(REC), Kathua, J&K on December 30, 1997. The objectives of the programme was to popularise sericulture, focus on new technology and to understand the problems and constraints faced by the rearers.

Dr. A.R. Trag, Director, State Sericulture Development Depart-

ment (SSDD), Jammu and Kashmir presided over and emphasised the importance of bivoltine sericulture and quality cocoons. Shri K.L. Gautam, Additional Director, SSDD, Jammu briefed the rearers about the contribution of Jammu region in the development of sericulture and possibilities for further expansion. Shri A.K. Misri, Joint Director, J&K, SSDD,

Jammu narrated the benefits of sericulture. Sh. D. Dutta, Manager, NABARD, Kathua gave a detailed account of the schemes of loans for the development of sericulture.

Dr. R.K. Fotadar, Assistant Director, REC, Kathua stressed the need for adopting high yielding mulberry genotypes for quality leaf production. Dr. B.B. Bindroo, Dy. Director, Regional Sericultural Research Station, Jammu gave a detailed account of technology evolved by the centre and its possible field application.

More than 100 persons comprising rearers, delegates from CSB, DOS, J&K, Banks and Krishi Vigyan Kendra, Kathua attended the programme. Two progressive rearers were given prizes for their achievement in cocoon crop productivity and mulberry cultivation. An exhibition was also organised on different aspects of sericulture besides displaying video cassettes.

**Report : R.K. Fotadar, SRO, REC, Kathua, J&K.**

## Farmers' Day on Muga Seed Rearing



**Farmers' Day in progress**

A Farmers' Day was organised at P2 Farm, Dusutimukh by Muga Silkworm Seed Production Centre, Sakrahi, Narayanpur, North Lakhimpur, Assam on December 30, 1997. The objec-

tive was to create awareness amongst the adopted farmers about the muga seed rearing for the production of high quality seed and its supply to farmers, Govt. agencies etc. Seventyone

adopted rearers from 14 villages attended the programme.

The scientists from Muga Seed Development Project, Guwahati and MSSPC, Narayanpur unit explained to farmers about the P4, P2 and P1 farms and also clarified their doubts with respect to muga seed rearing. Principal and lecturers of Kherajkhata College, Dusutimukh were also present and stressed the importance of expanding muga silk industry by producing and supplying high quality seed.

**Report : R.R. Basumatary, Asst. Director, MSSPC, Narayanpur, North Lakhimpur, Assam.**



In commemoration of Golden Jubilee of India's Independence, Research Extension Centre (REC), Bidaraguppe had arranged a Farmers' Meet at Attibele, Bangalore on 22nd December, 1997. More than 200 sericulturists of Anekal taluk participated.

Dr. A.K. Sikdar, Joint Director, RSRS, Kodathi, Bangalore inaugurated and said that REC has undertaken chawki rearing of  $P_1$  dfls. of  $NB_4D_2$  supplied by DOS and distributed to the farmers. The centre has also developed a two-acre plantation of  $V_1$  variety under nuclear plantation programme for distribution of mulberry seed cuttings to the farmers. The REC has also started group demonstration of new technologies.

Dr. R.K. Datta, Director, CSR&TI, Mysore in his presidential address, informed that CSB is aiming to transfer the new technologies developed at the institute.  $V_1$  variety has been developed which is more nutritional than the existing varieties. Also new bivoltine silkworm races viz.,  $CSR_2$ ,  $CSR_4$  and  $CSR_5$  have been developed.

## Farmers' Meet



**Shri Srinivasan, Joint Director, DOS addressing the farmers**

Shri R. Sreenivasan, Joint Director (Seed Area), DOS, Karnataka assured the seed rearers that the state government will take necessary action and will help in transfer of the new technologies to the field as soon as received from CSB. Shri Vijaya Prakash, Joint Director, CSR&TI, informed that new technologies should be implemented in Bivoltine Seed Area to improve the seed cocoon quality.

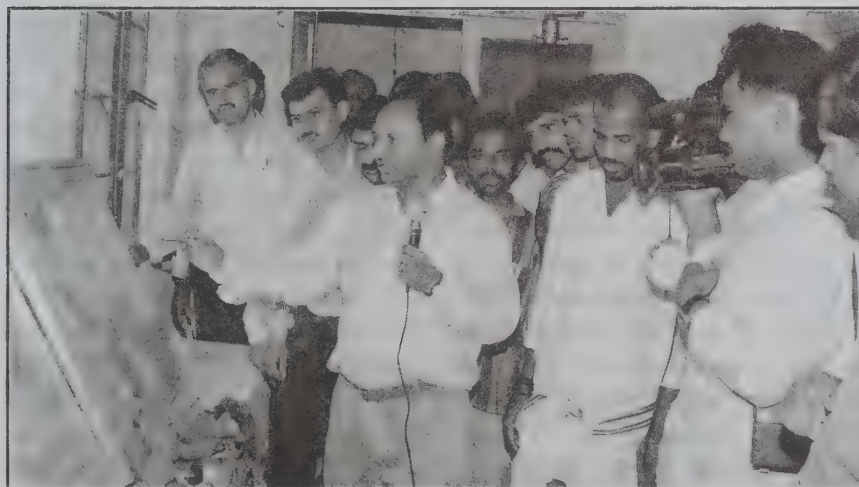
Shri T.M. Veeraiah, Joint Director, SSTL, Kodathi requested

the farmers to make use of the new races in appropriate manner and help in the quality production of silk. Shri H.K. Subbaiah, Assistant Director of Sericulture, Anekal Seed Area also addressed farmers to improve the seed cocoon quality by adopting new technologies.

Shri N. Ramasubbaiah, SRO, REC, Bidaraguppe and subject experts from CSR&TI, Mysore also spoke on the theme.

**Report : A.K. Sikdar, Joint Director, RSRS, Kodathi, Bangalore.**

## Workshop on Seed Rearing



**Participants attending to the display**

A workshop was organized on new technologies with special refer-

ence to seed rearing at Research Extension Centre, CSR&TI,

Rayachoti, Andhra Pradesh on December 23, 1997. The Dept. of Sericulture, Rayachoti had initiated the seed cocoon generation to attain self-sufficiency. The DOS had sought the technical support from REC to arrange a special programme for seed rearers to expose and to make them aware of the new technologies for generating quality seed cocoons. The programme was organised exclusively for the multi-voltine and bivoltine seed rearers.

The chief guest, Shri B. Chandra Sekhar, Regional Joint Director, DOS, Chittoor stressed the need self for sufficiency in seed cocoon generation. He advised the DOS technical staff to utilize the expertise of the scientists to make the seed area



programme a success. He had explained about different financial schemes for seed rearers.

Charing the workshop, Dr. N. Suryanarayana, Joint Director, Regional Sericultural Research Station, Anantpur said that the seed rearers should possess good mulberry garden with improved varieties for generating quality seed. He promised the farmers that mulberry cuttings of improved varieties would be supplied in the coming season.

Shri K. Chennakrishnappa, Assistant Director, DOS, Raychoti opined that the seed cocoons of local source will create confidence among farmers in generating quality layings as the rearing will be taken up under the supervision of DOS and REC.

Dr. N. Sivaramireddy, SRO, RSRS, Anantapur said that a perfect disinfection cum hygiene is the most important prerequisite for any seed rearer. He also advocated a voluntary chawki rearing centre by farmers preferably with an exclusive chawki garden with high inputs of manure.

Dr. S. Venkat Reddy, SRO, BSF, H. Hills explained the methods of bivoltine rearing.

Shri D. Rajareddy and Shri Venkatramana progressive seed rearers, narrated their experiences and how they could double the returns over CB rearings. They have requested the officers to deploy exclusive technical staff for seed programme.

Exhibition, field visit and interaction between farmers and subject experts were the other side-lights of the programme.

The workshop was attended by 18 technical personnel from DOS and 10 from CSB besides 100 farmers.

**Report : G.V. Prasad, SRA, REC, Rayachoti, Andhra Pradesh.**

## Enlightment Programme at K.G.F.



*JICA expert speaking on the occasion*

A one-day Enlightenment Programme on Bivoltine Silk Reeling, second in the series, was organised by the Central Silk Technological Research Institute (CSTRI), Central Silk Board on December 20, 1997 at the premises of M/s. Laxmi Silk Industries, Kolar Gold Fields in Karnataka. Sponsored by the Japan International Co-operation Agency (JICA) under the Bivoltine Sericulture Technology Development Project, the programme aimed at propagation of the production of quality bivoltine silk, its reeling and thereby the higher returns.

Keeping in view the need to improve the quality of Indian silk to the international standards, the Central Silk Board with the technical cooperation of JICA, is promoting the bivoltine silk. Over the past six years, many techniques and new races have been developed. Their adoption at the field level will obviously have an impact on the productivity and quality of silk.

The programme, as it reads, the enlightenment in the reeling of bivoltine silk, attracted more than 70 reelers and also some progressive bivoltine farmers from the villages of Chintamani, Kyalanur

and Kolar and also the President, Kyalanur Reelers' Association. The participants were taken around the reeling unit and explained about the role of the different components and their operations in obtaining quality silk. The gathering was addressed by the JICA experts Dr. Takamia and Dr. K. Yazima and the scientists of the CSTRI and Zonal Silkworm Seed Production Office at Bangalore, Central Sericultural Research & Training Institute, Mysore and also Shri Kirthy Narayana and Govinda Gowda, Assistant Directors of the Cocoon Market and State Department of Sericulture, Kolar, respectively.

Farmers and reelers were apprised of the latest techniques of bivoltine cocoon production, reeling, their relative benefits and also the loan-cum-subsidy scheme for the installation of CSTRI multiend reeling unit. The programme also included an interaction on field problems between the scientists and the bivoltine cocoon growers and reelers and suitable strategies were offered by the scientists.

**Report : Rajesh Kumar Sinha, Indian Silk, CSB, Bangalore.**



# Textile Trade Fairs – 1998

<i>Date</i>	<i>Exhibition</i>	<i>Place</i>	<i>Date</i>	<i>Exhibition</i>	<i>Place</i>
	<b>INDIA</b>				
1998 Mar 26-29	<b>GARTEX '98</b> Garment Machinery, Textiles & Accessories <i>Venue</i> : Pragati Maidan <i>Contact</i> : Modern Multi Media Marketing Co. (India) Pvt. Ltd. Ph : 5704450/4234 Fax: 091-011-5700644/2138	New Delhi	21-24	<b>INTERNATIONAL FASHION BOUTIQUE</b> Womens Apparel, Accessories and Jewellery, Immediate – Early Fall <i>Venue</i> : Javit Convention Centre <i>Contact</i> : The Larkin Group New York, NY 10018 Ph : 5940880 Fax: 1-212-5948556	New York U.S.A.
May 29-01	<b>ACC-MA-TEX-II</b> Garment Accessories, Machineries and Textiles (Hosiery and Textile Fabrics) <i>Venue</i> : Netaji Indoor Stadium <i>Contact</i> : Freeman Graphics & Designs Pvt. Ltd. Ph : 6607219/7441 Fax: 091-033-6607441/1803	Calcutta	24-26	<b>DESSOUS CHINA</b> Lingerie <i>Contact</i> : Igedo International Modemesse, D-40468 Dusseldorf Ph : 439601 Fax: 49-211-4396373	Shanghai China
	<b>OVERSEAS</b>		24-26	<b>TCF INTERNATIONAL</b> Clothing, Footwear and Fashion Accessory <i>Venue</i> : Darling Harbour <i>Contact</i> : Australia Exhibition Services Pty. Ltd., Melbourne, Victoria 3004 Ph : 92614500 Fax: 61-3-92614545	Sydney Australia
1998 Mar 15-18	<b>INTERNATIONAL KIDS FASHION</b> Childrenswear, Apparel, Accessories Footwear and Juvenile Products Fall – Back-to-school <i>Venue</i> : Javit Convention Centre <i>Contact</i> : The Larkin Group, New York NY 10018 Ph : 5940880 Fax : 1-212-5948556	New York U.S.A.	24-27	<b>HANOI TEXTILE AND GARMENT MACHINERY EXPO</b> <i>Contact</i> : CP Exhibition Wanchai Ph : 25117427 Fax: 852-25119692	Hanoi Vietnam
17-20	<b>VIETNAM TEXTILE AND GARMENT INDUSTRY EXPO '98</b> <i>Contact</i> : CP Exhibition Wanchai Ph : 25117427 Fax: 852-25119692	Hanoi Vietnam	25-28	<b>MUSETRA DE PARA LA CONFECCION</b> Clothing Machinery <i>Contact</i> : Fira de Barcelona Ph : 2332000 Fax : 34-3-2332311	Barcelona Spain
17-20	<b>VIETNAM FABRIC &amp; GARMENT ACCESSORIES EXPO '98</b> Textile and Garment <i>Venue</i> : Vietxo Cultural Palace <i>Contact</i> : CP Exhibition Wanchai Ph : 25117427 Fax: 852-25119692	Hanoi Vietnam	Apr 01-03	<b>INTERSTOFF ASIA</b> Fabrics, Fibres, Yarns, Accessories CAD/CAM <i>Contact</i> : Indo-German Chamber of Commerce, Mumbai Ph : 2186131 Fax : 91-22-2180523	Hong Kong China

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3.	Mr. Hussein Abdel Haq M/s. Sport Factory Amman, Jordan Tel : 00-962-6-630702 Fax : 00-962-6-616219	Textiles and Ready-made garments
4.	M/s. Fabric Clothes Industry Center Mr. Abdul Rahim El-Bodon, General Manager P.O.B. 2574, El'Mina, Tripoli (Lebanon) Fax : 961-6-614531	Textile machinery
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9.	Mr. J.W. Pidgeon General Manager P.O. Box 26255, Manama, Bahrain Tel : 644726 Fax : 644726	Textiles



# आजादी के बाद भारतीय रेशम का सफर

ए ए सिद्दीकी

**आ**जादी के 50 सुनहरे वर्षों में भारत ने कई क्षेत्रों में उल्लेखनीय प्रगति की है लेकिन, रेशम उत्पादन में आत्मनिर्भरता की उपलब्धि निकट नहीं। हालाँकि इस अवधि में रेशम का उत्पादन यथेष्टतः बढ़ा है, 1950 के दशक में जहाँ कच्चे रेशम का उत्पादन प्रति हेक्टेयर मात्र 17 किग्रा. था, अब बढ़कर 45 किग्रा. हो गया है। उल्लेखनीय है कि चीन में प्रति हेक्टेयर रेशम का उत्पादन 80 किग्रा. तथा जापान में 120 किग्रा. है।

केन्द्रीय रेशम बोर्ड द्वारा स्थापित रेशम अनुसंधान तंत्र का सुदृढीकरण पिछले पाँच दशकों में किया गया है तथा विविध क्षेत्रों में कुछ नये कीर्तिमान भी स्थापित हुए हैं तथापि कच्चे रेशम की लगातार बढ़ रही माँग के समक्ष हमारे प्रयासों के



शहतूत की समृद्ध फसल

होना अति आवश्यक है। इसको ध्यान में रखते हुए विकास के विभिन्न चरणों में केन्द्रीय रेशम बोर्ड ने प्रारम्भ के ही कुछ वर्षों में शहतूत रेशम के क्षेत्र में दो तथा गैर-शहतूत के क्षेत्र में एक केन्द्रीय अनुसंधान व प्रशिक्षण संस्थान तथा कोसोत्तर क्षेत्र में एक केन्द्रीय संस्थान की स्थापना की तथा कालांतर में समय की माँग के अनुरूप एक जननद्रव्य केन्द्र, एक रेशमकीट बीज प्रयोगशाला, एक रेशम जैव प्रौद्योगिकी प्रयोगशाला, शहतूत रेशम हेतु एक और संस्थान, अनेक क्षेत्रीय अनुसंधान केन्द्र, क्षेत्रीय अनुसंधान विकास केन्द्र, बीजोत्पादन केन्द्र, तकनीकी सेवा केन्द्र, प्रशिक्षण-सह-प्रदर्शन केन्द्र तथा पारि-परीक्षण प्रयोगशालाओं की स्थापना देश के विभिन्न प्रदेशों में की है। इसके अतिरिक्त, वर्ष 1989-96 के बीच विश्व बैंक और स्विस

**विश्व के वर्तमान रेशम उत्पादन मानचित्र पर एक नज़र डालें तो भारत में**

**आजादी के वर्षों से आज तक**

**लम्बा व गौरवपूर्ण इतिहास निश्चय ही प्रोत्साहनकारी होता है।**

**अनेक नये अनुसंधान हुए हैं,**

**शहतूती व गैर-शहतूती खाद्य पौधों व**

**रेशमकीट की नई प्रजातियाँ भी विकसित**

**की गई हैं। किन्तु अभी भी प्रयोगशाला और**

**प्रक्षेत्र के बीच की दूरी को और**

**कम करने की आवश्यकता है।**



कीटपालन में वैज्ञानिक दृष्टिकोण

परिणाम कदापि अभिनन्दनीय नहीं हैं। रेशम पैनेल की सिफारिशों के आधार पर 1948 के केन्द्रीय अधिनियम द्वारा केन्द्रीय रेशम बोर्ड का गठन 1949 में किया गया जिसका मुख्य कार्य रेशम उद्योग का देश में चौमुखी विकास करना तथा माँग के अनुसार रेशम का उत्पादन करना है। इन कार्यों के सुचारु रूप से निष्पादन के लिए अनुसंधान एवं विकास तंत्र का ढाँचा मजबूत

तालिका 1 : कच्चे रेशम का योजनावार उत्पादन एवं वृद्धि दर			
योजना	अवधि	कच्चे रेशम का उत्पादन (टन)	वृद्धि दर (%)
पंचवर्षीय योजनाओं के पूर्व	1950	1214	-
प्रथम पंचवर्षीय	1951-56	1437	0.20
द्वितीय पंचवर्षीय	1956-61	1513	0.25
तृतीय पंचवर्षीय	1961-66	2065	0.70
संक्रमण काल	1966-69	2320	0.91
चौथी पंचवर्षीय	1969-74	2894	1.40
पाँचवीं पंचवर्षीय	1974-78	3711	2.06
संक्रमण काल	1978-80	4805	2.96
छठी पंचवर्षीय	1980-85	7673	5.32
सातवीं पंचवर्षीय	1985-90	12016	8.90
संक्रमण काल	1990-92	11763	8.69
आठवीं पंचवर्षीय	1992-97*	14093	10.61
* अनुमानित			

योजनाओं पर प्रथम पंचवर्षीय योजना में 1.2 प्रतिशत से आठवीं योजना में 2855 प्रतिशत तथा राजकीय योजनाओं में 9.2 प्रतिशत से (प्रथम योजना) आठवीं योजना में 1675 प्रतिशत रहने का अनुमान है (तालिका-2)।

केन्द्रीय रेशम बोर्ड में कार्यरत वैज्ञानिकों में आधे से अधिक अनुसंधान कार्य में लगे हैं जबकि बाकी बीजोत्पादन, विस्तार एवं विकास कार्य में संलग्न हैं। इसके अतिरिक्त, राज्य सरकारों में स्थापित अनुसंधान संस्थान एवं विश्वविद्यालय में भी अनुसंधान कार्य किया जा रहा है। इनके अथक परिश्रम से वर्ष 1950 में हो रहे 1214 टन के रेशम उत्पादन को लगभग 12 गुने अर्थात् 14093 टन तक बढ़ाया जा सका है।

दूसरी ओर, विभिन्न फसलों, बागवानी, पशुपालन, मछलीपालन सहित अनेक क्षेत्रों पर नज़र डालें तो इसके पीछे भारतीय कृषि अनुसंधान परिषद् के अनुसंधान तंत्र के व्यापक विकास की भूमिका निश्चय ही विचारणीय है। कृषि के क्षेत्र में संगठित

विकास संस्था के सहयोग से राष्ट्रीय रेशम परियोजना का क्रियान्वयन पाँच परम्परागत राज्यों और बारह अपरम्परागत राज्यों के चुने हुए जिलों में रेशम के उत्पादन व विकास के लिए सुदृढ़ अवसंरचना का विकास किया गया।

कच्चे रेशम की उत्पादन वृद्धि प्रथम पंचवर्षीय योजना (1951-56) से तृतीय पंचवर्षीय योजना तक एक प्रतिशत से भी कम रही जो चौथी योजना में एक प्रतिशत से अधिक, पाँचवीं में दो प्रतिशत, छठी में पाँच, जबकि सातवीं व आठवीं योजनाओं में क्रमशः आठ प्रतिशत से अधिक व 10 प्रतिशत से अधिक हो गई है (तालिका-1)।

इसी प्रकार, विभिन्न पंचवर्षीय योजनाओं में खर्च की वृद्धि, केन्द्रीय

तालिका 2 : कच्चे रेशम के उत्पादन पर योजनावार व्यय का व्यौरा						
योजना	अवधि	केन्द्रीय योजनाओं पर खर्च (रू. लाख)	राजकीय योजनाओं पर खर्च (रू. लाख)	योग (रू. लाख)	खर्च वृद्धि दर	
					केन्द्रीय %	राजकीय %
प्रथम पंचवर्षीय	1951-56	12	22	34	-	-
द्वितीय पंचवर्षीय	1956-61	26	225	251	1.2	9.2
तृतीय पंचवर्षीय	1961-66	72	339	411	5.0	14.4
संक्रमण काल	1966-69	63	219	282	4.3	8.9
चौथी पंचवर्षीय	1969-74	82	593	675	5.8	25.9
पाँचवीं पंचवर्षीय	1974-78	586	1109	1695	47.8	49.4
संक्रमण काल	1978-80	1105	1259	2364	91.1	56.2
छठी पंचवर्षीय	1980-85	3715	8923	12638	308.6	404.6
सातवीं पंचवर्षीय	1985-90	8816	20680	29496	733.7	939.0
संक्रमण काल	1990-92	2669	13175	15844	221.4	597.8
आठवीं पंचवर्षीय*	1992-97	34276	36886	71162	2855.3	1675.6
* अनुमानित						





सम्यक् प्रणालियों से रेशम की गुणवत्ता सुनिश्चित

अनुसंधान के प्रतिफल स्वरूप वर्ष 1950 के गेहूँ का उत्पादन 60 लाख टन से बढ़कर अब 6 करोड़ टन अर्थात् 10 गुना हो गया। इसी प्रकार, आलू का उत्पादन 7 गुना, मक्के में 4 गुना, धान और गन्ने में 3 गुना बढ़ गया। इसी तरह, अन्य अनाजों इत्यादि की बढ़ोत्तरी के साथ हर क्षेत्र में उल्लेखनीय प्रगति हुई है।

वर्तमान में, रेशम परिधान के निर्यात से अनुमानतः 876.47 करोड़ रुपये की विदेशी मुद्रा का अर्जन होता है जो 60 के दशक में केवल 1.03 करोड़ रुपये की तुलना में 851 गुना बढ़ गया है। हालाँकि यह सर्वविदित है कि भारत में उत्पादित रेशम का लगभग 90 प्रतिशत घरेलू बाजारों में ही खपत होता है तथा इसका अधिकांश हिस्सा साड़ियों के उत्पादन में उपयोग होता है जिसका निर्यात बहुत ही कम मात्रा में होता है। विदेशों में अधिकतर सिले-सिलाये परिधानों की माँग है। एक रिपोर्ट के अनुसार सिले-सिलाये परिधानों की माँग साड़ियों की तुलना में 600 गुना अधिक है। अन्तर्राष्ट्रीय स्तर पर गुणवत्ता के क्षेत्र में हमारी स्पर्धा चीन से है।

इसलिए आवश्यकता इस बात की है कि रेशम उत्पादन के साथ-साथ हम गुणवत्ता पर भी पूरा ध्यान दें। हम यह जानते हैं कि गुणवत्ता नियंत्रण, परिरक्षण या परिवर्धन रेशम के उत्पादन में किसी एक प्रक्रिया विशेष पर आधारित नहीं है बल्कि शहतूत रोपण से लेकर कोसा उत्पादन एवं उच्च कोटि के धागा उत्पादन व परिधानों पर निर्भर करता है।

शहतूत कृषि व कोसा उत्पादन में हम आधुनिक तकनीकी से नई-नई विधियों व नई-नई प्रजातियों को विकसित करके कुछ हद तक आगे बढ़े हैं हालाँकि अभी अनेक मंजिलें हमारे सामने हैं। विशेषकर द्विप्रज रेशम उत्पादन में हमारी पैदावार में यथेष्टतः वृद्धि की आवश्यकता है जिसके कारण काफी मात्रा में द्विप्रज रेशम का आयात करना पड़ता है। वर्तमान में, हम द्विप्रज संकर रेशम का उत्पादन से करने में सक्षम हुए हैं लेकिन धागाकरण व बुनाई तंत्र तथा द्विप्रज फसल के मध्य एक तारतम्य स्थापित नहीं हो पाया है। अतः, इस क्षेत्र में हमें आधुनिक मशीन और तकनीक का विकास करना होगा जिससे हम माँग के अनुसार उच्च कोटि के रेशम व परिधान का उत्पादन कर सकें।

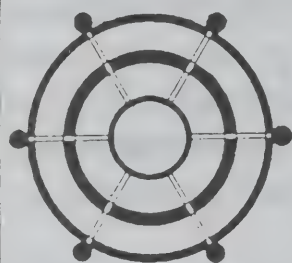
पिछले 48 वर्षों में अनेक अनुसंधान कार्य किए गए तथा नई-नई तकनीकों और प्रजातियों का विकास किया गया है जिन्हें अगर सभी इलाकों तक प्रभावी ढंग से पहुँचा दिया जाए तो देश के रेशम उत्पादन का नक्शा कुछ और ही होता मगर आज भी प्रयोगशाला और प्रक्षेत्र के बीच दूरी बनी हुई है। वास्तव में, अनुसंधान की सफलता किसानों द्वारा उनके समुचित उपयोग से आंकी जा सकती है; आम किसान आधुनिक तकनीक अपनाता तो चाहता है बशर्ते वह उसकी समझ व पहुँच के अनुकूल हो। विकास व विस्तार में लगे वैज्ञानिक अगर उनसे जुड़ें और उनके स्तर पर नई तकनीकों का लाभ उन्हें समझाएं, उनकी समस्या का निदान करें तो तस्वीर काफी कुछ बदल सकती है। हमारे वैज्ञानिक चुनौतियों का मुकाबला करने में सक्षम हैं। वह दिन दूर नहीं है जब माँग के अनुकूल गुणवत्ता मापदंडों के आधार पर उच्च कोटि के रेशम का उत्पादन होगा।

लेखक पी-3 मूल बीज फार्म, माजरा, देहरादून में कार्यरत हैं।

### रेशम निर्यातक एवं व्यापारीगण

इंडियन सिल्क देश-विदेश में रेशम उत्पादन एवं उद्योग तक आपका संदेश पहुँचाने का सर्वोत्तम माध्यम है।

विज्ञापन दर-सूची हेतु संपादक से संपर्क करें।



# Exports Review

Foreign exchange earnings of the Indian silk industry during the month of December '97 amounted to Rs. 8840.27 lakh compared to Rs. 7028.29 lakh during December '96.

During the first three quarters

## Review of Silkgoods Certified for Exports

During December 1997 and April to December '97 period of the year 1997-98

**TABLE - I**  
**Export Performance of Indian Silk Industry**

(Unit : Lakh ; Qty : Silkgoods ; Sq. Mtrs. ; Silkyarn/Silkwaste : Kg ; Value : Rs.)

Item of Export	December				% Increase		April to December				% Increase	
	1997		1996				1997-98		1996-97			
	Qty.	Value	Qty.	Value	Qty.	Value	Qty	Value	Qty.	Value	Qty.	Value
A. Silkgoods :												
(1) Mulberry												
(i) Dress Material	18.17	3587.66	15.11	2611.60	20.3	37.4	144.09	25482.26	149.54	24452.08	-3.6	4.2
(ii) Readymade Garments	3.10	1093.42	5.69	1377.33	-45.5	-20.6	40.63	12226.44	76.69	16518.15	-47.0	-26.0
(iii) Carpets	0.15	1425.26	0.11	1118.01	36.4	27.5	1.15	8757.53	0.77	6419.81	49.4	36.4
(iv) Sarees	2.22	493.62	2.49	476.57	-10.8	3.6	23.08	4862.00	26.10	4894.18	-11.6	-0.7
(v) Scarves/stoles	8.48	861.64	6.87	693.33	23.4	24.3	44.08	4671.88	58.45	5605.98	-24.6	-16.7
(vi) Others	2.03	632.10	2.40	388.14	-15.4	62.9	21.14	4503.26	24.03	4059.30	-12.0	10.9
Mulberry Total [i to vi]	34.15	8093.70	32.67	6664.98	4.5	21.4	274.17	60503.37	335.58	61949.50	-18.3	-2.3
(2) Tasar	1.75	268.72	1.10	154.69	59.1	73.7	7.35	1149.83	7.53	1341.43	-2.4	-14.3
Total [1+2]@	35.90	8362.42	33.77	6819.67	6.3	22.6	281.52	61653.20	343.11	63290.93	-18.0	-2.6
(3) Mixed/Blended	1.53	223.98	1.87	208.62	-18.2	7.4	18.33	2533.57	15.60	1643.68	17.5	54.1
Total [1+2+3]	37.43	8586.40	35.64	7028.29	5.0	22.2	299.85	64186.77	358.71	64934.61	-16.4	-1.2
B. SILKYARN	0.03	8.70	-	-			0.18	75.95	0.04	43.42	350.0	74.9
C. SILKWASTE	1.35	245.17	-	-			5.69	1028.26	0.08	11.40		
TOTAL [A+B+C]		8840.27		7028.29		25.8		65290.98		64989.43		0.5

@ Refers to total natural silk goods exports

viz., April to December '97 period of the year 1997-98, value of silk goods certified for exports amounted to Rs. 65290.98 lakh as against Rs. 64989.43 lakh during the corresponding period of previous year.

Data on itemwise silkgoods certified for exports by Central Silk Board are given in Table - I.

Comparative data on region-wise silkgoods certified for exports are given in Table-II.

### Natural silkgoods

During December '97, the natural silkgoods certified for exports amounted to 35.90 lakh sq. mtrs. valued at Rs. 8362.42 lakh as against 33.77 lakh sq. mtrs. valued

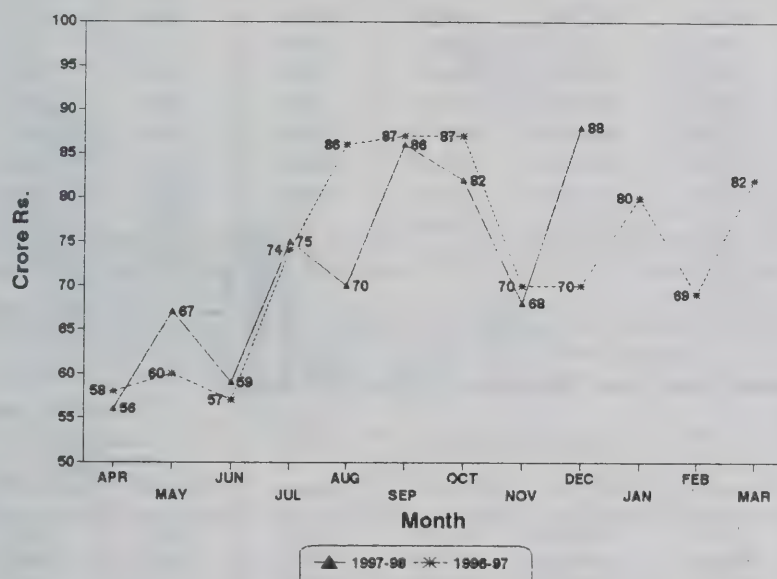


**Table - II**  
**Regionwise Silkgoods certified for exports**

[Unit:Lakh;Qty: Sq.mtrs;Value:Rs.]

Region	December						April to December					
	1997		1996		% Increase		1997-98		1996-97		% Increase	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
West Europe	17.49	4522.93	15.18	3260.75	15.2	38.7	121.78	27015.51	140.12	25919.66	-13.1	4.2
U.S.A. & Others	9.52	2430.07	9.94	2166.24	-4.2	12.2	102.61	23930.58	135.28	26191.59	-24.1	-8.6
Asia	5.99	1073.73	8.02	1206.67	-25.3	-11.0	58.11	9575.71	60.90	8913.10	-4.6	7.4
Japan & Others	0.56	171.10	0.71	175.36	-21.2	-2.4	5.75	1567.09	7.62	1791.97	-24.5	-12.5
Africa	0.34	125.06	0.52	107.85	-34.6	16.0	5.52	1541.28	5.39	1110.84	2.4	38.7
East Europe	3.53	263.51	1.27	111.42	178.0	136.5	6.08	556.60	9.40	1007.45	-35.3	-44.8
Total	37.43	8586.40	35.64	7028.29	5.0	22.2	299.85	64186.77	358.71	64934.61	-116.4	-1.2

### Certified Silk Export Earnings



at Rs. 6819.67 lakh during the corresponding month of previous year.

During April to December '97 period of the year 1997-98, the aggregate natural silkgoods certified for exports amounted to 281.52 lakh sq. mtrs. valued at Rs. 61653.20 lakh as against 343.11 lakh sq. mtrs. valued at Rs. 63290.93 lakh during the corresponding period of preceding year and showed a decrease of 18% in quantity and 2.6% in value.

### Mulberry silkgoods

During December '97, mulberry silkgoods certified for

**Table - III**  
**Centrewise/Varietywise Silkgoods/Silkyarn/Silkwaste certified for exports during April to December '97 period of the year 1997-98**

[Unit:Lakh;Qty:Silkgoods:Sq.mtrs:Silkyarn/Silkwaste:Kg:Value:Rs.]

Centre	Mulberry		Tasar		Mixed Blended		Sub-Total		% Share		Silkyarn		Silkwaste		Grand Total Value	% Share of Centre
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value		
Mumbai	31.51	7078.12	1.58	364.85	2.67	587.74	35.76	8030.71	11.9	12.5	0.10	24.29	0.00	0.00	8055.00	12.3
Bangalore	98.47	17715.14	0.34	55.62	5.04	247.00	103.86	18017.76	34.6	28.1	0.03	33.37	0.00	0.00	18051.13	27.6
Bhagalpur	9.54	1267.14	0.84	146.83	2.36	228.39	12.74	1642.36	4.2	2.6	0.00	0.00	0.00	0.00	1642.36	2.5
Chennai	8.95	2390.08	0.12	24.09	1.21	171.45	10.27	2585.62	3.4	4.0	0.00	0.00	5.58	1005.89	3591.51	5.5
Calcutta	36.89	6290.23	2.79	349.25	1.21	66.57	40.89	6706.05	13.6	10.4	0.05	18.30	0.11	22.37	6746.72	10.3
New Delhi	80.02	24429.76	1.39	156.57	0.39	62.94	81.80	24649.27	27.3	38.4	0.00	0.00	0.00	0.00	24649.27	37.8
Varanasi	4.85	643.31	0.29	52.61	5.45	1169.47	10.59	1865.40	3.5	2.9	0.00	0.00	0.00	0.00	1865.40	2.9
Srinagar	3.28	582.14	0.00	0.00	0.00	0.00	3.28	582.14	1.1	0.9	0.00	0.00	0.00	0.00	582.14	0.9
Hyderabad	0.66	107.46	0.00	0.00	0.00	0.00	0.66	107.46	0.2	0.2	0.00	0.00	0.00	0.00	107.46	0.2
Total	274.17	60503.37	7.35	1149.83	18.33	2533.57	299.85	64186.76	100.0	100.0	0.18	75.96	5.69	1028.26	65290.98	100.0

**Table - IV**  
**Foreign Exchange Earnings from Mulberry Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	December		%	April to December		%	Country Share Percentage in	
	1997	1996		1997-98	1996-97		1997-98	1996-97
U.S.A.	2096.35	1835.50	14.2	20614.05	22707.34	-9.2	34.1	36.7
Germany	1369.07	1149.91	19.1	9388.04	8999.06	4.3	15.5	14.5
U.K.	930.52	688.40	35.2	5894.53	6313.29	-6.6	9.7	10.2
France	816.29	405.08	101.5	2970.21	2219.25	33.8	4.9	3.6
Italy	524.22	235.37	122.7	2261.55	1685.36	34.2	3.7	2.7
U.A.E.	266.42	288.62	-7.7	1901.14	1757.75	8.2	3.1	2.8
Canada	139.27	158.24	-12.0	1813.96	2009.52	-9.7	3.0	3.2
Hong Kong	222.90	207.42	7.5	1599.90	1602.63	-0.2	2.6	2.6
Singapore	114.26	112.48	1.6	1529.81	1613.16	-5.2	2.5	2.6
Netherlands	154.82	167.95	-7.8	1130.86	1317.16	-14.1	1.9	2.1
Denmark	48.91	45.92	6.5	802.34	521.82	53.8	1.3	0.8
Australia	48.88	49.66	-1.6	730.09	921.20	-20.7	1.2	1.5
Switzerland	76.04	83.97	-9.4	707.97	743.19	-4.7	1.2	1.2
Thailand	26.71	5.77	362.9	625.68	244.01	156.4	1.0	0.4
Mauritius	62.71	52.64	19.1	587.18	354.19	65.8	1.0	0.6
Spain	94.23	112.01	-15.9	564.01	666.79	-15.5	0.9	1.1
Japan	89.44	91.71	-2.5	514.50	560.93	-8.3	0.9	0.9
Malaysia	28.97	48.91	-40.8	460.22	416.11	10.6	0.8	0.7
Belgium	71.84	54.48	31.9	423.40	539.74	-21.6	0.7	0.9
Austria	57.21	79.51	-28.0	420.42	639.34	-34.2	0.7	1.0
Others	854.64	791.43	8.0	5563.51	6116.66	-9.0	9.2	9.9
Total	8093.70	6664.98	21.4	60503.37	61949.50	-2.3	100.0	100.0

@ Refers to top 20 importing countries

**Table - V**  
**Foreign Exchange Earnings from Tasar Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	December		%	April to December		%	Country Share Percentage in	
	1997	1996		1997-98	1996-97		1997-98	1996-97
Germany	62.36	33.22	87.7	210.38	268.05	-21.5	18.3	20.0
U.S.A.	59.53	18.64	219.4	182.74	263.88	-30.7	15.9	19.7
France	61.73	6.75	814.5	128.07	50.44	153.9	11.1	3.8
Hong Kong	9.00	-	-	104.47	12.31	748.7	9.1	0.9
U.A.E.	5.06	14.40	-64.9	95.46	130.24	-26.7	8.3	9.7
Japan	8.63	24.59	-64.9	78.27	129.19	-39.4	6.8	9.6
Italy	7.51	11.56	-35.0	51.12	55.91	-8.6	4.4	4.2
Brazil	10.87	3.01	261.1	36.58	23.29	57.1	3.2	1.7
U.K.	5.83	7.98	-26.9	36.02	89.95	-60.0	3.1	6.7
Spain	4.23	1.73	144.5	33.70	14.82	127.4	2.9	1.1
Turkey	-	-	-	16.51	10.10	63.5	1.4	0.8
Canada	7.49	1.09	587.2	14.92	27.94	-46.6	1.3	2.1
Kuwait	2.32	1.86	24.7	14.76	25.63	-42.4	1.3	1.9
Saudi Arabia	3.25	8.04	-59.6	14.71	12.23	20.3	1.3	0.9
South Africa	1.22	-	-	14.38	10.97	31.1	1.3	0.8
Belgium	1.27	0.50	154.0	13.88	3.79	266.2	1.2	0.3
Argentina	3.79	-	-	11.86	2.14	454.2	1.0	0.2
Afghanistan	4.10	0.81	406.2	10.02	6.59	52.0	0.9	0.5
Colombia	-	-	-	9.60	-	-	0.8	0.0
Chile	-	-	-	6.85	4.29	59.7	0.6	0.3
Others	10.53	20.51	-48.7	65.53	199.67	-67.2	5.7	14.9
Total	268.72	154.69	73.7	1149.83	1341.43	-14.3	100.0	100.0

@ Refers to top 20 importing countries

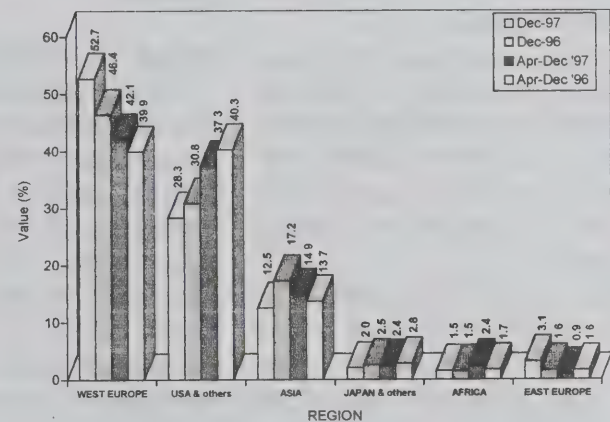
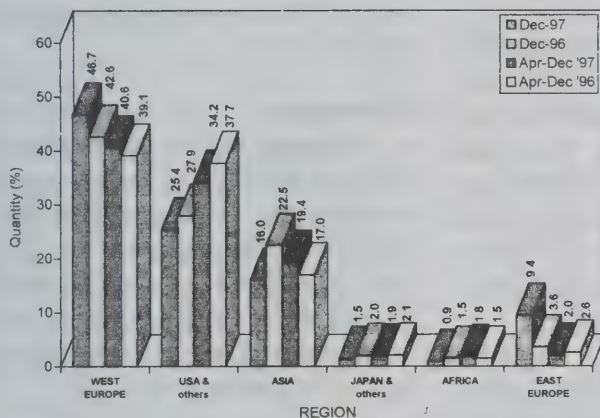


**Table - VI**  
**Unit Export Price**

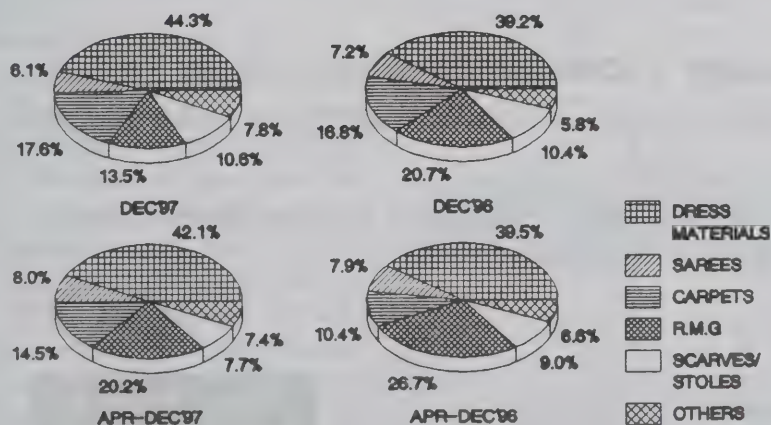
(Rs. per Sq.mtr.)

Item	December			April-December		
	1997	1996	% Increase	1997-98	1996-97	% Increase
<b>A. Mulberry Silkgoods</b>						
1. Excl. Carpets	196.14	170.40	15.1	189.53	165.86	14.3
2. Incl. Carpets	237.03	204.03	16.2	220.68	184.61	19.5
3. Carpets	9610.03	9899.14	-2.9	7603.21	8314.09	-8.6
<b>B. Tasar Silkgoods</b>	153.81	139.91	9.9	156.51	178.17	-12.2

### REGION-WISE SILKGOODS CERTIFIED FOR EXPORTS



### Share percentage of Varietywise Mulberry Silkgoods Export Earnings



exports amounted to 34.15 lakh sq.mtrs. valued at Rs. 8093.70 lakh as against 32.67 lakh sq. mtrs. valued at Rs. 6664.98 lakh during December '96.

During April to December '97 period of the year 1997-98, mulberry silkgoods certified for exports amounted to 274.17 lakh sq. mtrs. valued at Rs. 60503.37 lakh compared with 335.58 lakh sq. mtrs. valued at Rs. 61949.50 lakh during the corresponding period of 1996-97. It showed a decrease of 18.3% in quantity and 2.3% in value. Out of the total natural silkgoods certified for exports, the share of mulberry silkgoods roughly amounted to 97% in quantity and 98% in value.

Countrywise data of mulberry silkgoods certified for exports is given in Table - IV.

#### **Varietywise mulberry silkgoods**

During April to December '97 period of the year 1997-98, among the various varieties of mulberry silkgoods certified for exports, dress materials ranked first followed by readymade garments, carpets, sarees and scarves/stoles. Data of varietywise mulberry silkgoods certified for exports are given in Table - I.

#### **Tasar silkgoods**

During December '97, tasar silkgoods certified for exports amounted to 1.75 lakh sq.mtrs. valued at Rs. 268.72 lakh compared with 1.10 lakh sq.mtrs. valued at Rs. 154.69 lakh during December '96.

During April to December '97 period of the year 1997-98, a total quantity of 7.35 lakh sq. mtrs. of tasar silkgoods valued at

Rs. 1149.83 lakh were certified for exports as against 7.53 lakh sq. mtrs. valued at Rs. 1341.43 lakh during the corresponding period of previous year.

Countrywise data of tasar silkgoods certified for exports are given in Table-V.

#### **Unit export price**

The unit export price realised for mulberry and tasar silkgoods during December '97 and April to December '97 period of the year 1997-98 along with comparative data of previous year are given in Table-VI.

#### **Mixed or blended silkgoods**

During December '97, mixed/blended silkgoods certified for exports amounted to 1.53 lakh sq.mtrs. valued at Rs. 223.98 lakh compared with 1.87 lakh sq. mtrs. valued at Rs. 208.62 lakh during December '96 and showed an increase of 7.4% in value.

Mixed/blended silkgoods certified for exports during April

to December '97 period of the year 1997-98 amounted to 18.33 lakh sq. mtrs. valued at Rs. 2533.57 lakh compared with 15.60 lakh sq. mtrs. valued at Rs. 1643.68 lakh in the corresponding period of previous year and reflected an increase of 17.5% in quantity and 54.1% in value.

#### **Silkyarn**

About 18 tons of spun and noil silk yarn valued at Rs. 75.95 lakh has been certified for exports during April to December '97 period of the year 1997-98 as against 4 tons valued at Rs. 43.42 lakh in the corresponding period of 1996-97.

#### **Silkwaste**

Silkwaste and its bye-products certified for exports during April to December '97 period of the year 1997-98 amounted to 569 tons valued at Rs. 1028.26 lakh as against 8 tons valued at Rs. 11.40 lakh in the corresponding period of previous year.

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# Silk Prices

December 1997

## Raw Silk : Volume of Transaction

At all the silk exchanges in Karnataka, a total quantity of 141.268 tons of all qualities of raw silk valued at Rs.1485.516 lakh was transacted during the month of December '97 as against a quantity of 146.824 tons valued

Silk Exchange alone accounted for 77.6% and 73.2% in both quantity and value, respectively.

During the first nine months of the year 1997-98 (i.e., April to December '97) at Bangalore Silk Exchange, a total quantity of 1025.325 tons of all qualities of raw silk valued at Rs. 10057.882 lakh was transacted. The volume of trade at

Bangalore Silk Exchange during the period April to December '97 accounted for 79.7% in quantity and 75.9% in value of the total transaction in all silk exchanges of the State.

Data on qualitywise transaction of raw silk at Bangalore Silk Exchange *vis-a-vis* at all the silk exchanges in Karnataka during December '97, December '96,

**Table I. Transaction of Raw Silk at Bangalore Silk Exchange**

Raw Silk Quality	(Qty. : Tons, Value : Lakh Rs.)							
	December '97		December '96		April '97-December '97		April '96-December '96	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Filature/ Cottage Basin	23.949 (45.870)+	323.831 (616.041)	23.919 (39.206)	323.967 (532.098)	191.285 (361.121)	2489.277 (4699.622)	194.548 (348.514)	2577.343 (4590.736)
Charka	61.990 (70.802)	638.411 (738.796)	74.106 (83.665)	850.414 (969.571)	614.439 (697.108)	6356.268 (7270.347)	590.382 (691.705)	6505.906 (7664.708)
Dupion	23.757 (24.596)	124.863 (130.679)	23.613 (23.953)	146.153 (148.444)	219.601 (227.879)	1212.337 (1272.672)	206.433 (207.711)	1224.003 (1232.178)
Total	109.696 (141.268)	1087.105 (1485.516)	121.638 (146.824)	1320.534 (1650.113)	1025.325 (1286.108)	10057.882 (13242.641)	991.363 (1247.930)	10307.252 (13487.622)

+ Figures in bracket refer to total transaction at all the Silk Exchanges in Karnataka

at Rs. 1650.113 lakh during December '96. During the first nine months of the year of 1997-98 (i.e., April to December '97), at all silk exchanges in Karnataka, a total quantity of 1286.108 tons valued at Rs. 13242.641 lakh was transacted as against 1247.930 tons valued at Rs. 13487.622 lakh of the preceding year.

## Bangalore Silk Exchange

At Bangalore Silk Exchange alone, which is the largest exchange in Karnataka, a total quantity of 109.696 tons of all qualities of raw silk *viz.*, filature/cottage basin, charka and dupion, valued at Rs. 1087.105 lakh was transacted during December '97 as compared to 121.638 tons valued at Rs. 1320.534 lakh during December '96. Of the above transaction in Karnataka State, the volume of transaction at Bangalore

**Table II. Transaction of Filature raw silk of different deniers at Bangalore Silk Exchange during December '97**

Denier	Quality	Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
				Min.	Max.	Avg.
13/15	Fine	2323	3391146	1345	1600	1460
14/16	Fine	1928	2716468	1330	1450	1409
16/18	Fine	3939	5400061	995	1490	1371
18/20	Medium	5004	6564318	800	1540	1312
20/22	Medium	6477	8389127	600	1480	1295
22/24	Medium	311	385707	1125	1380	1240
24/26	Medium	658	855733	1100	1425	1301
26/28	Coarse	2490	3577472	1030	1575	1437
28/30	Coarse	163	208425	985	1410	1279
30/32	Coarse	657	894665	1140	1550	1362
	Total	23950	32383122	600	1600	1352

**Table IIa. Transaction of Charka raw silk of different varieties at Bangalore Silk Exchange during December '97**

Varieties	Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
			Min.	Max.	Avg.
Coarse	2882	2293736	620	998	796
Medium	29771	27128623	605	1180	911
Fine	29337	34418741	851	1450	1173
Total	61990	63841100	605	1450	1030

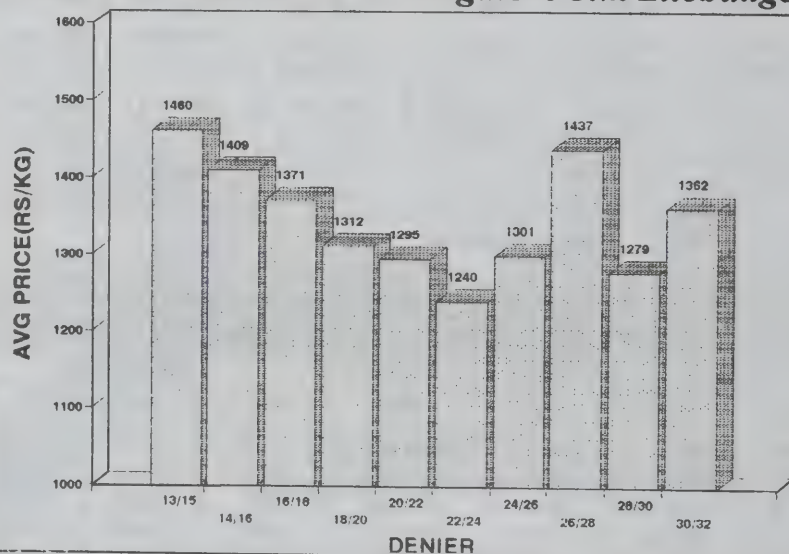


**Table III. Prices of Indigenous Silk**

Silk Exchange	Variety	(Rs./Kg)					
		December '97			December '96		
		Min	Max	Avg	Min	Max	Avg
Bangalore Silk Exchange (Karnataka)	Filature/Cottage Basin	600	1600	1352	710	1625	1354
	Charka	605	1450	1030	600	1450	1148
	Dupion	150	830	526	300	930	619
Anna Silk Exchange, Kanchipuram Market (Tamil Nadu)	Filature/Cottage Basin	1120	1280	1208	1230	1420	1311
	Charka	850	955	912	810	1080	989

**Table III (contd). Imported Silk (Varanasi Market)**

Filature Silk 20/22 dr.	(Rs./Kg)			
	December '97		December '96	
	Min	Max	Min	Max
Chinese	1450	1580	1250	1400
Korean	1450	1510	1250	1480

**Average Prices of Denierwise Filature Raw Silk Transacted at Bangalore Silk Exchange**

April '97 to December '97 and April '96 to December '96 are given in Table-I and transaction of raw silk of different deniers of filature/cottage basin rawsilk at Bangalore Silk Exchange during December '97 is given in Table-II. Qualitywise charka rawsilk transaction during December '97 is given in Table-IIa.

#### Prices of sericultural commodities

The prices of different qualities of indigenous raw silk ruled at Bangalore Silk Exchange (Karnataka) and Anna Silk Exchange (Tamil Nadu) in addition to prices of imported raw silk at Varanasi market during the month of December '97 in comparison with December '96 are given in Table - III.

Also the prices of different varieties of mulberry reeling cocoons quoted at important cocoon markets of southern states viz., Karnataka, Tamil Nadu and Andhra Pradesh are given in Table IV.

**Table IV. Mulberry Reeling Cocoon Prices**

State	Market	Variety	(Rs./kg.)			
			December '97		December '96	
			Min	Max	Min	Max
Karnataka	Ramanagaram	Imp. cross breed	85	172	59	165
	T. Narasipur	Ord. cross breed	32	80	24	89
Tamil Nadu	Vaniyambadi	Imp. cross breed	54	90	56	128
	Coimbatore	Imp. cross breed	71	115	55	140
Andhra Pradesh	Hyderabad	Multivoltine	30	109	61	148
	Dharmavaram	Multivoltine	46	135	53	149

Compiled by Statistical Section, CSB

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The complete sericulture and silk industry journal of India

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# Credit to Sericulture :

## Tips to Tune

**I**n the previous issue, we discussed about the need of rationalising the system to improve the credit inflow to the sericulture sector. Let us discuss further and dwell upon some of the suggestions made during the recent workshop and the discussions with the experts which could help break the ice.

The NABARD Unit Cost for Sericulture introduced as a model for the bankers is unfortunately being considered as 'the cost' and needs immediate reconsideration. The unit cost, as the Chief of NABARD himself puts it, is only indicative and the bankers can modify it with due consideration for the local factors and needs. The unit cost will be more realistic, if revised regularly on the basis of prevailing market rates.

The sericultural practices are region and season specific in nature and hence, the credit needs too differ from place to place and activity to activity. It would be more logical to have the unit cost and the credit system, accordingly. Involvement of the developmental agencies like Central Silk Board and the Departments of Sericulture in such exercises of fixing or revising the unit cost will not only help the banking sector to design more realistic unit cost structure but also to extend more credit for the improved/recommended technologies that could assure better utilisation of the facility.

The developmental agencies, on the other hand, can be far more discrete while processing the loan applications. This would boost the confidence of the banker and encourage him to lend more freely. Linking the credit availability to some kind of auto-repayment system would help minimise the

number of defaulters. Besides, more closer coordination between the developmental agencies and the bankers, especially at the block level, to identify the priority areas for credit in sericulture suiting the local needs and also in selection of the beneficiaries will not only induce better accountability but also encourage quality lending. In addition, educating the sericulturists on the adverse effects of being a defaulter will help in arresting the problem of repayment to a certain extent.

It is observed that many a time, the field level staff of the lending agencies lack sufficient knowledge of sericulture which hinders the process. Regular awareness programmes involving CSB, NABARD and the lead banks to acquaint them with various activities of the industry will improve the situation.

There is also a need to keep the procedure in lending to the minimum to speed up the process. Introduction of facilitators, who can assist the needy in preparation of papers required for credit availment can also be thought of. It is also worthwhile to think of encouraging group or cluster lending concept through cooperative societies and NGOs who can work for the betterment of their members with a collective approach.

In fact, much of the hurdles in the flow of credit to the sector could be minimised, if not completely removed, by active involvement of all the players within the system. These tips, if put to practice, could bring in a noticeable change. Why not give a try for the cause of the industry ?

 **Editor**

## Reasonable Reasons

This has a reference to the letter of Dr. Tribhuwan Singh published under this column in **Indian Silk**, January '98, on the article "पूर्वांचल में रेशम उत्पादन एवं परम्परागत कृषि - एक अध्ययन" (Oct. '97).

- As per the notification of Central Silk Board (**Indian Silk**, Oct. 1995), an authorised silkworm hybrid for commercial rearing in Uttar Pradesh, SH<sub>6</sub> x NB<sub>4</sub>D<sub>2</sub> was used during spring and autumn. However, popular multi x bi hybrids such as N x NB<sub>4</sub>D<sub>2</sub> and PM x NB<sub>4</sub>D<sub>2</sub> were used during summer and rainy seasons, respectively.
- In terms of return, the best rearing season is spring followed by autumn as bivoltine hybrids are reared only during these two seasons. Though the availability of leaves is more and cocoon yield per acre with PM x NB<sub>4</sub>D<sub>2</sub> (multi x bi) is better during rainy season, the price fetched by the crop is less than bivoltines of spring and autumn.
- In this region, improved mulberry varieties such as S<sub>1635</sub> yield upto 10 MT leaves/acre/year but, silkworm rearing can not be practised by the farmers for almost a period of six months (25 April - 15 Aug. and 15 Nov. - 15 Feb.) due to extremely hot May and June months and two pruning operations at the onset of monsoon and in winter season. That is why, only 625 dfls are reared per acre inspite of the availability of 10 MT of leaves.
- Brushing in the third week of March is not recommended for summer crop as the spring

crop in this region is taken during Feb./March. As a result, it can be taken during April in order to provide atleast two-three weeks of March for full realisation of leaf yield from the same plantation after spring crop and fertilizer application. Indoor temperature during April in this region goes beyond 30°C for two-three hours only in the afternoon. As per earlier reports, outdoor temperature limits to 34-42°C during summer crop (**Indian Silk**, March 1997). Similar conditions prevail during summer in Andhra Pradesh and Tamil Nadu, where multi x bi crops are taken successfully.

Dr. R.K. Pandey,

Dr. R. Kumar, S.B. Saraswat,

Dr. Gargi & R.V. Kushwaha

Purvanchal Sericulture Development Project, Varanasi (U.P.)

## Clarification, Please !

This has a reference to the article "Blue! The Breed is True!!" by Monica Chaudhuri *et al.* (**Indian Silk**, January 1998).

The article has created a confusion among the scientists of muga sector because if the blue breed is true then blue worms would have been predominant instead of green ones, in view of the indicated superiority of blue strain in all respects.

The blue coloured muga silkworm larvae are described as "breed true" by simply dwelling upon some irrelevant parameters against the available information on the behaviour of muga silkworm.

Hence, the observations in the article call for clarification and elaboration on the following points:

1. Silk yield is one of the most important characters in the determination of the superior-

ity of the race/line but here no data is presented on the performance of commercial crops reared during Spring (June-July) and Autumn (Oct-Nov).

2. Mention of general and specific combining abilities of the inbreeding "Blue" lines to support the declaration of the "Breed True" is missing.
3. The article is also lacking the information about the segregation which plays a vital role in maintenance of different lines. Rearing assessment of MSDP, Tura indicates that blue colour line has not been giving consistent performance in the last five years indicating that the line is not breed true.
4. Without assessing the diallel cross and double cross results analyses, it is very surprising to find the mention of the superiority of blue lines over mid-parent.
5. The genes (Y, b and S) which are supposed to control the body colours of the silkworm larvae do affect the prothoracic hood mark and dorsal shining spots, which has no mention in the article.

Dr. Alok Sahay and

Dr. R.N. Singh

Regional Development Office

Central Silk Board,

Guwahati (Assam)

## Utility of Coining New Terminology

This has a reference to the article "Dietary efficiency and silk productivity" by Kanika Trivedi and K. Sashindran Nair (**Indian Silk**, January 1998). It draws attention of breeders to plan strategic breeding lines on nutritionally efficient breeds.

The efficiency of conversion of ingesta and digesta into whole body,



cocoon, pupa and shell has already been worked out extensively for Japanese, Chinese and a few Indian breeds and adequate literature is available.

The terms "leaf cocoon conversion rate" and "leaf silk conversion rate" are nothing but the ECI of cocoon and shell (Cocoon wt/Ingesta x 100 and Shell wt/Ingesta x 100 (ref: Waldbauer and Horei *et al.*) and hence, it is not wise to replace internationally accepted terms with fictitious terms in scientific research.

Further, It is better to express nutritional efficiencies on dry weight basis, as they are more authentic when compared to wet weight basis. Wet basis studies need specific stimulated conditions as well as utmost care in data collection due to continuous moisture loss during experimentation. the best and the comparable index at field level as yet is only "leaf cocoon ratio" as per the standard rearing practice. In this article, the ECI of shell and cocoon is replaced by the conversion rate. If the quantum of leaf converted into cocoon or cocoon shell/unit time (hour) is worked out using proper data in place of already known nutritional indices, then it would have been a comparable information for assessment of breeds. However, the data provided for the few new races/breeds have no relevance until the sample size and the replicates are according to the statistical design and the results compared accordingly, for their significance. In the article, the ingesta has been expressed per 40000 larvae which seems to be derived for mass population. The computation of data for 40000 larvae is very difficult giving room for increase in error percentage and also would amplify/boost the results.

Dr. K.V. Anantharaman

Central Silk Board, Bangalore

## Question and Answer

**B.S. Ghatnatti,**

**J.S.S. College, Gokak, Belgaum, Karnataka.**

**Q : What is the percentage contribution of seed production by different agencies and average production of cocoon per 100 dfls in Karnataka state ?**

**A :** The seed production by various agencies viz., state, central and private is given below :

Sl. No.	Particulars	State		Central CSB	Total
		DOS	LSPs		
1.	Seed Production [in lakh dfls]				
	i. Bv [hybrid]	53.00	0.00	14.15	67.15
	ii. Cross breed	366.00	1250.00	62.50	1678.00
	iii. Multivoltine	99.00	0.00	0.00	99.00
2.	Percent Production				
	i. Bv [hybrid]	75.00	4.79	20.21	100.00
	ii. Cross breed	20.00	76.50	3.50	100.00
	iii. Multivoltine	96.00	4.00	—	100.00
3.	No. of grainages				
	i. Bv [hybrid]	23	—	2	25
	ii. Cross breed	69	916	7	992
	iii. Multivoltine	28	—	—	28

The average cocoon production per 100 dfls is 38 - 39 kg.

## Indian Silk Subscription Revised

*Dear Readers,*

*While there had been a considerable hike in the prices of all the materials and services that go in for production of a magazine, over the previous years, we stood by our commitment to serve the industry and you, even at our cost. But now, we have been forced to price per copy of the magazine at Rs. 20 and the annual subscription at Rs. 240. The overseas subscription will be US \$ 50 (Airmail). This increase comes into effect from April '98 subscriptions. We hope our valued readers will extend their support as ever.*

**Editor**

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### Certificate/Structured Courses of Central Silk Board (April-June 1998)

Institute	Course	Duration (Days)	Month of commencement
<b>CSR&amp;TI, MYSORE</b> Central Sericultural Research and Training Institute, Central Silk Board, Srirampura, Manandavadi Road, Mysore South, MYSORE - 570 008, KARNATAKA.	1. Extension Education Management 2. Mulberry Cultivation Technique and Disease Control 3. Soil Fertility Management 4. Basic Stock and Farm Management 5. Chawki Rearing Techniques 6. Intensive Bivoltine Training	5 30 5 6 10 35	April/June May June June May June
<b>CSR&amp;TI, BERHAMPORE</b> Central Sericultural Research and Training Institute, Central Silk Board, BERHAMPORE - 742 101 Dist. Murshidabad, WEST BENGAL.	1. Problematic Soil and Amendment 2. Farm Management 3. Extension Education 4. Integrated Soil and Nutrient Management 5. Reeling and Spinning	6 6 6 6 14	June May April April May
<b>CTR&amp;TI, RANCHI</b> Central Tasar Research and Training Institute, Central Silk Board, Piska Nagri, RANCHI - 835 303, BIHAR.	1. Post Graduate Diploma in Non-Mulberry Sericulture*	15 (Months)	15th June
<b>CSR&amp;TI, PAMPORE</b> Central Sericultural Research and Training Institute, Central Silk Board, P.B. No. 88, GPO, SRINAGAR - 190 001, J & K.	1. Intensive Bivoltine Training	45	April
<b>SSTL, KODATHI</b> Silkworm Seed Technology Laboratory, Carmelram Post, KODATHI, BANGALORE - 560 035, KARNATAKA.	1. Seed Crop Monitoring 2. Egg Handling Techniques	15 15	April May
<b>CSTRI, BANGALORE</b> Central Silk Technological Research Institute, B.T.M. Layout, Madivala, Hosur Road, BANGALORE - 560 068, KARNATAKA.	1. Silk Throwing and Weaving 2. Silk Dyeing and Printing 3. Machinery Maintenance 4. Raw Silk Testing and Grading	42 30 6 14	May June June April

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# Magnesium Management in Mulberry

N.R. Singhvi, M.R. Subbaswamy and R.K. Datta

**I**ntensive mulberry cultivation and use of high yielding varieties have undoubtedly helped in increasing mulberry leaf production and productivity. However, higher crop yield depletes nutrients from soil and intensively cultivated plants are often subjected to limiting levels of mineral nutrition. Intensive cultivation without balanced fertilization leads to multiple plant nutrient deficiencies.

---

***Magnesium is one of the indispensable nutrients for mulberry, the deficiency of which can affect the metabolism of the plant. The article deals with the management of magnesium which helps promote the growth of mulberry resulting in better silkworm nutrition and higher yield.***

---

Magnesium (Mg), a secondary plant nutrient, is indispensable nutrient for plant. Its management is of considerable importance in view of the large area under acid soils where inadequate Mg can be a production constraint. However, recently its deficiencies

have been reported even in neutral soils. Less work has been done on magnesium among the major plant nutrients and its nutritional aspect has not been given adequate attention so far.

## **Mg in soil**

Magnesium is the eighth most common element in lithosphere with an average concentration of 2.1%. However, due to weathering of relatively soluble Mg minerals, the average concentration is only 0.5%.

Mg in the soil is a constituent of many soil minerals. It is present as exchangeable Mg, the cation exchange complex and in soil solution as the Mg ion. Small amount of Mg may also be combined in the soil's organic fraction. Plant roots absorb soluble and exchangeable Mg which is assumed to go into solution before absorption by the root.

Soil pH and Mg availability are directly related. As pH of soil increases above 7, availability of Mg increases. Reverse is true for decrease in soil pH. All the Mg minerals with pH values below 7.0 become soluble and hence, are leached out of weathered soil and are not likely to remain in soil even when Mg is added. If pH increases above 8.5 there is reduction in availability of Mg as sodium and potassium replaces calcium as well as Mg on the clay crystals, and the Mg precipitates as carbonates.

## **Depletion of Mg**

Magnesium is required in large amount by most of the plants and its requirement is like phosphorous. It doesn't get fully absorbed in soil like phosphorous. Consequently, it was never considered necessary to apply Mg to every crop and the majority of the soils have reserves making it unnecessary. Mg is slowly lost in the soil in drainage water as well as in crops. Hence, soils without large reserves gradually become deficient. This depletion has accelerated in recent years because the supply of Farm Yard Manure, which contains a lot of Mg has declined sharply in arable lands. As a result, the Mg deficiency is being observed in various crops.

Mg plays an important role in the plant. It is a component of chlorophyll, ribosome and chromosomes (Metzler, 1977). Chlorophyll usually accounts for 15 to 20% of the total Mg contents of plant. As a component part of chlorophyll, Mg is crucial for photosynthesis.

It is involved in numerous enzymatic reactions. First, it may serve to link the enzyme and substrate together, eg. in reactions involving phosphate transfer from ATP. Mg is an activator of many of the phosphate transfer reactions (except phosphorylase) of enzymes involved in the synthesis of nucleic acids. As such, Mg is crucial for the reactions of energy metabolism. Mg is also

implicated in phloem loading of sucrose in leaves.

### Mg deficiency

Mg deficiency affects every facet of the metabolism of the plant. Biosynthetic pathways are deranged, as a result of inhibition of essential enzymatic transphosphorylations, and soluble nitrogenous compounds are present at elevated concentrations. Mitochondria are also affected by Mg deficiency.

Mg is readily translocated from mature to young, actively growing regions of the plant. As a result, it is in mature leaves where deficiency symptoms first appear. Mg content below 0.2% (on dry weight basis) in crops can cause clinical symptoms of Mg deficiency. Visual deficiency symptoms in mulberry plants are:

- Mature leaves becomes totally yellow with reddish green patches,
- In young leaves chlorosis observed inbetween veins gradually passes throughout the leaves.

### Mulberry crop response

Crop response to Mg fertilizer would be expected in soils with exchangeable Mg less than 0.006 meq/100g soil. Application of 50-100 kg Mg/ha is sufficient to raise exchangeable Mg above this critical

level. At the same time, the Mg/kg ratio would need to be maintained above 1.0 (as meq/100 gm) which is reported to be the critical level for a range of crops. Lokanath and Shivashankar (1985) reported that foliar spray of Mg (1.25 kg/ha) exert an influence on growth and yield of mulberry. As such, reports are scanty in mulberry in this direction.

### Impact of Mg deficiency on silkworm

The importance of Mg in silkworm diet was stressed by Shyamala and Bhat (1968). Vishwanath (1969) found good response to Mg in silkworm economic characters. According to Lokanath and Shivashankar (1985), leaves collected from mulberry plants, foliar spray of Mg (1.25 kg/ha) when fed to silkworm, favourably influenced the cocoon yield and shell percentage. Subburathinam *et al.* (1990) observed that minerals like  $MgCl_2$  at 1% level increase the economic characters. Mg (2.49 ppm) has been reported to accelerate the growth of silkworm through orientation of physiological activities and thereby reduce the larval duration, increase the oviposition rate in adult and silk content in the cocoon (Thangavelu and Bania, 1990).

In view of the importance of

Mg not only for mulberry growth and yield but also for silkworm nutrition; health, growth and economic characters, it becomes imperative that Mg be included in crop management programme.

### Tips

- Decide about Mg requirement based on soil analysis.
- Use soil amendments to correct problematic soils (acidic and alkali soils, with pH 8.5 and above), so as to improve availability of Mg to plants.
- On land which needs periodic liming, Mg can be cheaply supplied by using magnesium lime in place of some or all of the ordinary lime.
- Apply 50-100 kg Mg/ha in soils deficient in exchangeable Mg. Foliar application in the form of  $MgSO_4$  or  $MgCl_2$  can also be used to supply Mg to crops.
- In problematic soils, foliar application of Mg is considered markedly superior. Moreover, the soil application in such cases is uneconomical as high amount of Mg fertilizer need to be supplied in soil.
- Supply FYM/compost, rich in Mg, to soil in sufficient quantity since prevention is better than cure.

*The authors are with CSRTI, Mysore.*

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# Role of Soyabean Protein in Silkworm Nutrition

K.M. Subbu Rathinam and M. Krishnan

One way of improving the cocoon yield is to achieve an increase in the larval weight by enriching the nutrition of silkworm by supplementing the mulberry leaves with extra nutrients. In India, the possibility of giving an ideal artificial diet to silkworm at mass level is still remote. Therefore, one of the effective methods to enrich the leaves is to supplement them with various 'fortification agents'. In recent years, attempts have been made to fortify

---

**Soyabean protein plays a prominent role in enriching the nutritional level of mulberry leaves. The authors delineate the significance of soyabean protein in the diet of silkworms.**

---

the leaves (particularly mulberry) with nutrients like proteins, amino acids, vitamins, minerals, carbohydrates, crude wastes of jaggery and molasses so as to enhance the quality and quantity of crop yield. Among these, dietary protein plays a vital role in insect nutrition, especially in silkworm, *Bombyx mori*.

## Importance of protein

The quantity of dietary protein is important in insect herbivore feeding, growth, survival and population dynamics. It has been proved that a nutritionally unbalanced protein diet will reduce a herbivore's growth rate by imposing a metabolic load. Thus, a balanced protein diet is essential for the optimal growth of silkworm. A myriad of proteins like soyabean protein, casein, egg albumin gossypol, bovine serum etc., have been used as a supplementary source, but among them soyabean protein is opted by sericulturists as it is highly nutritive and also affordable. Soyaprotein, offers an ideal opportunity to provide high quality proteins, with rich amino acids at lowest possible price. Besides serving as a good source of mineral like iron, soyabean also contains vitamins although in low amount.

## Soya protein

Soybean and its products are used as protein sources in silkworm diets. In 1975, Ito and his team claimed that only minor differences exist in the amino acids compositions between mulberry leaves and soyabean meal. The co-efficient of pattern similarity between the two was calculated to be 0.925. Because of such similarity soyaprotein has been included in the feed of silkworm since long. Soyabeans are rich in

protein (38–42%) and contain other nutrients such as carbohydrates and lipids. Among the soyabean products, soyabean protein, soyabean meal and defatted soyabean meal are used commonly.

## Bioassay study

While discussing the effect of protein in insect nutrition, emphasis should be on the optimal level of dietary protein because, the protein is effective only up to an optimal level beyond which the larval growth is impeded considerably. It has been recently reported that soyabean meal accelerated the silkworm larval growth significantly upto a certain level, but excess of defatted soyabean meal in the diet has a detrimental effect. The table shows the optimal dose of different protein sources.

## Haemolymph storage protein profile

In silkworm, storage proteins are the major haemolymph proteins, playing an important role as reservoirs for amino acids that are utilized during larval-pupal transformation, vitellogenin synthesis and adult development. Horie *et al.* (1971) pointed out that the total haemolymph protein level in the silkworm larvae is closely associated with the level of essential amino acids in the artificial diet. The concentration of haemolymph

**Table : Bioassay analysis of different protein sources for insects**

Species	Protein source	Optimal dose (%)
<i>Pseudosarocophaga</i>	Amino acid mixture	2-3
<i>Bombyx mori</i>	Casein	0.5
	Milk powder	10
<i>Tribolium castaneum</i>	Casein	8
<i>B. mori</i>	Soyabean meal	60
	Milk casein (Hammarten)	10
	Egg albumin	30
	Amino acid mixture	30
<i>Heliothis zea</i>	Casein	1.25
<i>Spodoptera exigua</i>	Casein	1.25-4.2
<i>B. mori</i>	Soyabean meal	3
<i>H. zea</i>	Casein	2-3
	Soya protein	2-5
	Gluten	1-2
<i>S. exigua</i>	Casein	2.30
	Gluten	2.2-6.2
	Soya protein	1.2-2.5
<i>B. mori</i>	Hydrolyzed soya protein	2
<i>B. mori</i>	-do-	2

proteins were found to be the highest in silkworm larvae fed on artificial diet containing soyabean protein and rose markedly with the elevation in the level of dietary protein. Similarly in 1990, Nagata and Kobayashi suggested that the accumulation of haemolymph proteins like storage proteins (SP<sub>1</sub> and SP<sub>2</sub>) in the silkworm, *B. mori* was influenced by soyabean protein content of the artificial diet.

### Nutritional indices

In 1971, Kamioka and his team reported that in *B. mori*, the efficiency of conversion of ingested (ECI) and digested (ECD) protein increased with the elevation of soyabean protein concentrations in the artificial diet. Similarly, the

ECI and ECD were enhanced in the silkworm larvae fed on mulberry leaves supplemented with single cell protein, *Spirulina*.

### Larval and cocoon characters

Kumararaj *et al.* (1972) reported that the casein supplementation along with mulberry leaves enhanced the silkworm larval, cocoon and shell weights, cocoon shell ratio, absolute silk content and filament length of the cocoon. A similar trend was also observed by Horie and Watanabe (1983) in *B. mori* fed with artificial diet containing different concentration of soyabean protein. Increased and decreased larval durations were observed by Mathavan *et al.* (1984)

when the silkworm larvae were fed on single cell protein fortified mulberry leaves. The larval weight, effective rate of rearing (ERR), cocoon, shell weight and cocoon/shell ratio were increased when silkworm larvae were fed on mulberry leaves supplemented with soybean meal (Subbarao, 1989). They also pointed out that low soybean concentrations (1-3%) was effective in improving the larval and pupal characters than higher concentrations. Watanabe *et al.* (1990) observed that the larval weight increased with increasing levels of soya protein in the artificial diet. A positive relationship between soya protein content and silkworm larval weight was observed by Zhang *et al.* (1991). They also observed an inverse relationship between the protein content and the larval duration of the fifth instar of *B. mori*. Recently it was also proved that hydrolyzed soyprotein increased the larval, cocoon, shell weight, cocoon/shell ratio, fecundity and haemolymph storage proteins (Krishnan *et al.*, 1995; Vanishree *et al.*, 1996).

These studies have categorically shown that the increased protein content in nutrition enhances the cocoon production by accelerating the larval growth and protein, particularly soya protein, is essential in silkworm nutrition.

*The first author is with Department of Biotechnology, J.J. College for Arts and Science, Pudukottai, Tamil Nadu. The second author is with Department of Biotechnology, Bharathidasan University, Tiruchirappalli, Tamil Nadu.*

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# Assessment of Mulberry Hybrids: A New Approach

K. Vijayan, S.P. Chakraborti, B.N. Roy and B. Saratchandra

**I**n India, mulberry breeding is not well organized unlike other crops and breeders in different parts of the country follow their own system or adopt the technique followed in temperate countries like Japan and China with a few or no modifications. Since the growth pattern of mulberry varies distinctly with environment, adoption of temperate technique in

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***The article reveals a new system of progeny assessment of seedlings which will greatly help the mulberry breeders in saving money, time, manpower and materials. Besides, the new approach will help attain a well-organised mulberry breeding in the country.***

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toto in tropical conditions may not help many of the field problems that Indian mulberry breeders face at present.

In the conventional method, the screening of F1 hybrid starts with raising of seedlings in nursery bed followed by transferring them into progeny row trial plots for initial assessment. The progeny row trial experiment is traditionally



**Fig. 1. Three months old seedling on the seed bed before first thinning**

followed by planting seedling under 60 x 60 cm spacing or following the Indo-Japanese method of 20 x 60 cm with 120cm between two pairs of row. The seedlings are screened on the basis of comparative performance. The selected single superior F1 hybrid is multiplied for further evaluation in Primary Yield Trial (PYT), along with check variety, in augmented or simple lattice design. From the PYT, 7-8 hybrids superior to check are selected and tested in Final Yield Trial (FYT) under recommended package for release of variety.

Thus in this method of initial screening, only a single plant, that too the seedling, is considered for selection, which very often leads to unavoidable error. No compari-

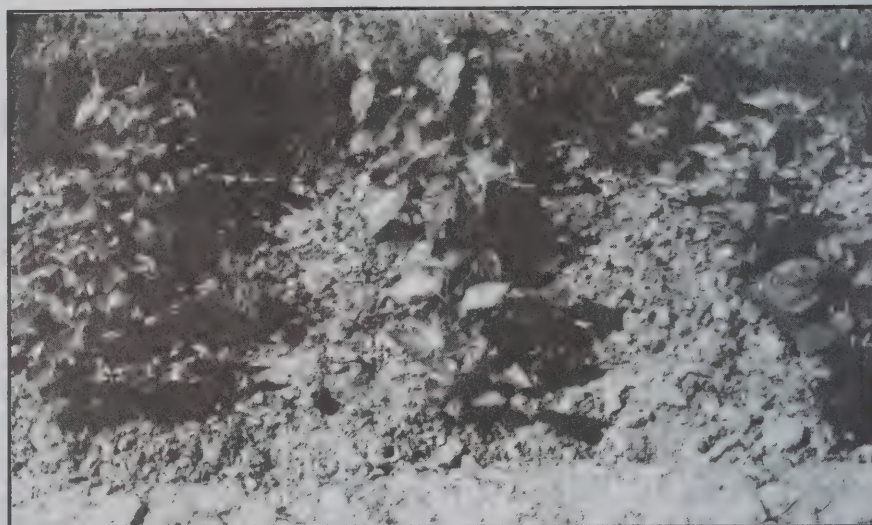
son is made with the ruling or control varieties at this stage of assessment. As a result, there is a possibility of selecting a seedling which performs well in the lot but fails to perform better than the ruling varieties when comparison is made between them in the later stage of evaluation i.e., in the PYT. This delay in finding out the comparative performance of the selected F1 hybrid is causing economic loss in the form of time, manpower and materials. In order to circumvent this problem, an improvement in the existing system of progeny assessment has been found useful not only to reduce the time required to release a variety but also to help the breeder eliminate the inferior ones at an early stage of assessment so



that valuable time and money can be saved.

### Modified method

**Raising and selection of seedlings:** The total amount of seeds of individual cross collected during the usual breeding period of January-March is sown in rows in the seedling bed during April-May. The seedling bed is of 120 cm in width and length of 300 cm (Fig. 1). The seeds are sown with the spacing of 10 cm from seed to seed and 15 cm from row to row. After three



**Fig. 2. Clonal comparison trial showing assessment of hybrids**

Schematic diagram of the proposed plan for developing mulberry varieties in India	
Hybridization	Feb-March
↓	
Seed collection	April
↓	
Raising of seedlings	May
↓	
1st thinning	August
↓	
2nd thinning	October
↓	
Visual selection on 9 characters & identification of promising hybrids	November
↓	
Clonal comparison	2nd to 4th year
↓	
Multiplication	5th year
↓	
IET	6th to 8th year
↓	
Release of variety	9th year.

months of growth the first thinning is done by removing the weaker seedlings. In the fifth month a second thinning is done on the basis of visual observation of vigour. During the seventh month only 2-5% of the initial population is retained on the basis of visual observation of length of the shoot, leaf texture/ colour, inter-nodal distance, presence or absence of secondary branches, posture, leaf lobation, thickness and size. These selected plants are allowed to attain a height and maturity to get a minimum of 7-10 cuttings from each selected seedling. In general, it has been observed that 9-10 months' growth gives such height and maturity. The stem cuttings obtained from these selected plants are utilized for setting up the "Clonal Comparison Experiment" or the Progeny Row Trial Experiment.

**Clonal comparison trial:** In comparison, plant a minimum of 7 cuttings of each hybrid along with cuttings from 4 checks planted in rows under 60 cm x 60 cm spacing with recommended package of practices so that at least five central plants can be used for further assessment (Fig. 2). The length of the plot should not

exceed 50 feet and in each plot all the checks are to be planted in random along with other hybrids. The plants grown from these cuttings are left undisturbed for one year to facilitate proper establishment. From second year onwards data on leaf yield and related characters are studied for two years. Since the ruling variety is used as check, a major advantage of this experiment is the identification of those F1 hybrids which are superior to the ruling variety. This early identification helps the breeder to eliminate all the plants which are inferior to the ruling variety. In the old system of progeny assessment, this kind of comparison is made only in the second phase of assessment in the PYT which generally takes more than 9 years. Similarly in the old system, performance of a single seedling is considered for its selection, which often leads to misleading results. Thirdly, selection on the basis of the performance of seedling need not always necessarily hold true in the clonal progenies due to the differences in the root system. Another advantage of this system over the old one is that getting adequate number of stem cuttings to set up Initial Evaluation Trial



(IET) from a single plant is very difficult. However, in the present system, cuttings can be obtained from 7-10 plants in the comparison plot as well as from the mother stock in the seedling bed. Hence, in many ways the present system of progeny assessment is advantageous for the breeder and is far superior to the conventional method of single seedling assessment.

*Initial evaluation trial:* The present initial evaluation trial is equivalent to earlier Final Yield Trial (FYT) because in the earlier system primary yield trial was used to test the performance of selected F1 hybrids with that of the ruling variety in clonal form. A large number of hybrids were usually tested in this experiment and 7-8 superior hybrids were selected for testing in FYT under recommended package of practices. Since in the present system the hybrids are evaluated in the clonal comparison plot, a separate study for this purpose is not required again. Thus, in the IET, 7-9 superior hybrids along with the check are planted in RBD with 3-4 replications and each replication contains 49 plants from each variety. Data on leaf yield and other qualitative and quantitative characters are recorded from second to third year to select and release the variety. Since the design and object of this experiment meet the purposes of earlier FYT, there is no need to set up another FYT for the release of a variety. Hence, at least 4-5 years can be saved through this system of progeny assessment. Thus, this system of hybrid assessment enables the breeder to release a variety within 9 years from the hybridization as indicated in the schematic presentation of the method.

**The authors are with CSRTI, Berhampore, West Bengal.**

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# Andhra Pradesh: Women Empowerment in Sericulture

Dayanand Bidari and M. Rajasekhar Reddy

**W**omen play a dominant role in sericulture but their involvement is usually restricted to less skillful labour intensive activities in both cocoon and reeling sectors. They enjoy subordinate status in decision making in the sericulture practicing families. The extension agencies generally interact with the male members of the families. The information

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***The Government of Andhra Pradesh had declared 1994 as the Year of Women in Sericulture and prepared an action plan to ensure greater participation of women in sericulture activities by improving access to resources, enhancing managerial autonomy and imparting better knowledge and skills. The authors discuss the impact of the plan based on a study made.***

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related to various technological packages as well as the skills is provided to the male members through training programmes and get exposed to extension activities. As a result, the women's role



***Sericulture helps women help themselves***

remains restricted to low paid traditional activities, whereas men, by virtue of their better access to information, training inputs and resources enjoy much better status in the form of higher wages and income.

In line with the Central Silk Board's decision, the Government of Andhra Pradesh had also declared 1994 as the Year of Women in Sericulture and prepared an action plan to ensure greater participation of women in sericulture activities by improving access to resources, enhancing managerial autonomy and imparting better knowledge and skills.

## **Methodology**

The observations were made in selected districts of Andhra Pradesh viz., Ananthapur, Chittoor, Cuddapah, Warangal,

Karimnagar and Vizag where the women action plan is in operation. The information gathered regarding various schemes implemented under women action plan, were presented in two dimensions. The first dimension deals with the focus of the scheme and the second with the status in terms of operational problems.

The women covered under this, mostly belonged to resource poor and disadvantaged segment of the rural population and the action plan aims at reaching out women with sericulture technologies through the following schemes.

## **Assignment of government land to women groups**

It envisages organising women of scheduled castes and backward castes into groups and provides access to resources like land,



*Effective extension brings in awareness*

inputs, information and skill to enable them to take up sericulture. Land is allotted to individual members of the groups on patta. Borewells are dug, sheds constructed and inputs like mulberry slips, fertiliser, dfls and rearing equipment etc., were supplied by the sericulture department to the groups. Training is organised in groups to equip them with the technical know-how.

In this way, it is planned to enhance the individual income potential of the women and thereby augment their status in the household and the community in respect of decision making, access to resources and the benefits flowing out of sericulture.

Though the scheme's objectives are laudable, a number of operational problems affect its smooth implementation. A few important problems:

- \* The land has been earmarked for groups of women, but patta in their names is yet to be recorded and papers to be handed over. As a result, the women are facing sense of insecurity in respect of their tenure/status.

- \* With DRDA's assistance of Rs. 14,000, construction of rearing sheds in their homesteads has been taken up. But due to lack of appropriate training, they are using the sheds as residence also. As a result, the rearing of worms is affected.

- \* The land allotted to the women's groups is located far off from their homes. The women find it difficult to regularly supervise mulberry cultivation, as they have to carry out household responsibilities also. As a result, the crop growth gets affected and in turn the feed quality becomes poor, leading to poor growth of the worms.

#### **Assistance to women groups**

This scheme intends to bring the existing functional thrift group members into the fold of sericulture. If the members agree to take up sericulture as one of their group income generating activities, each thrift group is provided assistance to the tune of Rs. 50,000, in two instalments. The amount is meant for meeting the expenses towards

equipments, purchase of inputs etc. In this way, it is expected that the thrift groups would be able to augment their income potential and in turn increase the silk production.

Various operational problems in implementation of the scheme are:

- \* The scheme envisages optimum level of dfls brushing by each member of the group. Based on such assumption, equipments like trays and chandrike are purchased. But in reality the women are not able to produce sufficient mulberry leaves, which reduces brushing of dfls. Thus, a good number of trays and chandrike remain unutilised.
- \* The women rearers are not getting sufficient quality of dfls in the government grainages. Hence, they have to procure dfls from private grainages, which have a low hatching percentage, thereby affecting the productivity of cocoons.

#### **Training women rearers**

The women members of new and existing groups are provided training for a period of 30 days on mulberry cultivation and silkworm rearing, apart from arranging farmers meet, keeping in view their reproductive roles. The training is conducted mostly through demonstrations in selected farms and rearing houses of sericulturists. As a result, enabling women in the form of awareness building and acquisition of knowledge is contemplated.

A few problems encountered are:

- \* The demonstrations are mostly conducted at the premises of the big farmers, representing the upper castes in the villages. The women belonging



to the disadvantaged sector feel reluctant to attend such trainings. Thus, the transfer of capability of such women gets affected and is evidenced through gaps in knowledge and skill required to take up sericulture effectively.

- \* Even the sericulturists' meet of two days' duration also was dominated by women from upper castes. As a result, the problems faced by the scheduled caste women do not get reflected properly.
- \* The women being mostly illiterate or neo-literate, find it difficult to comprehend the information mostly given through verbal media.

### **Facilitating marketing of cocoons**

The main intention behind this scheme is to provide increased access to the women sericulturists towards various cocoon marketing facilities. The women are first educated about the mode of transactions in the cocoon market and also made aware of the various eligible facilities and incentives. Their names are entered into the rearers' pass books maintained by

the sericulture departments. Various facilities extended to women in the cocoon market to encourage their direct participation include cocoon bids exclusively earmarked for women and rest room facilities.

Extent of women's participation in marketing of cocoon varies from region to region. Generally, women find it difficult to take part in marketing in view of their reproductive roles. As a result, the men dominate in the cocoon markets with fewer number of women.

### **Suggestion and conclusion**

A perusal of the implementation of major schemes under women action plan indicates a few gender related strategies to be adopted for more effective implementation:

- \* The distribution of land rights in the form of patta should be expedited to secure more enthusiastic response.
- \* While selecting the land for patta allocation proximity to the village should be one of the prime considerations.
- \* The women need to be properly educated on the various

technological dimensions of sericulture and closer monitoring by sericulture department is needed to ensure appropriate utilisation of various infrastructural facilities.

- \* While conducting demonstrations for women sericulturists, the social dynamics should be looked into, more effectively.
- \* In view of the prevalent problems of women's attending centralised marketing centres, establishment of clusterwise collection centres and monitoring will facilitate the participation of women more effectively. The extension network should be appropriately supplemented with more women workers. The women are not getting sufficient quantity of dfls in govt. grainages. To avoid this situation and to gain the confidence of women, the department may supply chawki worms to women rearers.

It is advisable to use adequate visuals and audio-visuals in such trainings.

***The authors are with National Institute of Rural Development, Rajendranagar, Hyderabad.***

## **CSB Literature**

In the background of growing interest in sericulture and silk industry in the country, there appears to be considerable demand for sericulture related literature. The Central Silk Board, in its service to the community of sericulture and silk industry publishes from time to time brochures, books, periodicals not only in English and Hindi but also in many Indian languages. Educative video cassettes on various technologies in Indian and foreign languages help you practise sericulture the right way.

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# Impact of Pruning of Muga Silkworm Food Plants

A.A. Siddiqui, Babu Lal and P.K. Das

**S**om (*Machilus bombycina* Syn. *M. Percea*) and Soalu (*Litsaea polyantha*) are the primary food plants of muga silkworm *Antheraea assamia* which grow tall in nature and go upto 25-30 metres. Silkworm rearing on such tall trees becomes difficult and inconvenient. Besides, there is no check on the pests and predators

**Pruning of food plants of muga plays an important role in the proper development and rich harvest. The authors discuss the impact of pruning on these food plants in detail.**

resulting in poor harvest of cocoons. Further, unpruned plants produce matured and diseased leaves with less moisture and nutrient contents. The feeding of such leaves causes heavy mortality of silkworm due to virosis.

To make silkworm rearing convenient and to enhance production of quality leaves, there is a need to check the vertical growth of the food plants. The dwarfing should not be effected abruptly, instead the food plant should be trained/pruned properly right from the seedling stage. Systematic pruning helps in diversification of energies to the selected branches



Pruned plants of som (*M. bombycina*)

for higher yields. Plants of 10-15' height with spreading crown bearing rich foliage are ideal for management and rearing. The quality of leaves greatly influences the growth of silkworm and production of cocoons. Pruning results in production of nutritive leaves with high protein and carbohydrate with ideal moisture content.

Pruning and pollarding are the only ways to remove the old and unproductive shoots/branches besides help defending the spread of a number of pests and diseases like stem shoot borer, etc.

## Aim and objective

Pruning of muga food plants is necessary to regulate shape and check vertical growth of trees, divert the energy of food plants

from reproductive growth to vegetative growth and to increase the quality and quantity of foliage. Objectives of pruning are :

- ☐ To maintain manageable height for convenience of rearing, keep vigil on pests and predators and also to cover the bushes with nylon net to save 30% early instar larvae from pests and predators.
- ☐ To induce more vegetative growth
- ☐ To form a satisfactory crown in order to maintain the shape and size of the plant
- ☐ To prevent formation of weak crotches
- ☐ To thin out dense growth
- ☐ To adjust the leaf production period to synchronize with silkworm rearing



**Table. Cropwise pruning schedule of som**

Crop	Period of Pruning	
	Early stage worms	Late stage worms
Aherua (Jun-Jul)	I week March	I week February
Bhodia (Aug - Sept)	I week April	I week March
Kotia (Oct - Nov)	I and II week July	I week June
Jarua (Dec - Jan)	I week Sept.	I week August
Chotua (Feb-Mar)	I and II week Oct.	I and II week, Sept.
Jethua (April - May)	I week Dec.	I week Nov.

Note : Light pruning (Removal of 25% biomass) first instance followed by clipping second instance in a year.

- ❑ To remove dead and unproductive shoot/branches
- ❑ To provide better aeration for the plant ensuring luxuriant and healthy growth of foliage
- ❑ To expose the plant for better sunlight
- ❑ To improve the quality of foliage.

### Stage of pruning

In order to streamline the branching pattern and desirable plant architecture, plants should be pruned by following the open centre system. In this system, main trunk is never allowed to grow beyond a certain height (5-6') thereby inducing subsequent

growth by lateral branches. Initial training should be carried out only by clipping, training, pruning and thinning out. Drastic pruning should be carried out when plants have attained good growth and atleast five years of age. The pollarding of food plants should be done at 5' height from ground level after every five or seven years. In between, light pruning of 1" girth should be carried out after one-two years.

### Types of pruning

The removal of old and unproductive shoot is primarily done in two different ways ; Heading back and Thinning out.

### Heading back

In heading back, individual shoots or branches are cut to remove the terminal part. The effect is to stimulate growth through remaining lateral buds or branches. Hormones (mainly auxins), which inhibit the growth of lateral buds, are synthesized in the terminals of shoots and when these terminals are removed, the inhibiting influence is no longer present. Hence, the lateral buds grow more freely. In practice, limbs may be headed back in variable degrees. Depending upon the severity, heading back is grouped as under.

**Clipping or training:** When the terminal buds only are removed. The clipping/training should be carried out after completion of each rearing.

**Light pruning:** When about 25% of the biomass is removed. The light pruning should be practised once in a year preferably after Jethua crop.

**Heavy pruning:** When about 50% of the biomass is removed. Heavy pruning should be resorted to after 2-3 years.

**Pollarding of top coxing:** When drastic pruning is done i.e., more than 50% of the biomass is removed leaving tree trunk only. The pollarding should be carried out after 5-7 years.

### Thinning out

This consists of removal of only over-crowded and criss-crossed branches. Thus, thinning out is an extension or complement of heading back. Thinning out provides proper light and aeration which ensures luxuriant and healthy growth of shoot and foliage.

In both heading back and thinning out, cuts should be made which may heal readily. Healing in each case occurs by growth of tissue from cambium of the



**Black plantation of som**

margin of the wound. The healing process is called overwaling. Normally, the pruning is done immediately after the node where side limbs or lateral buds occur. If the cuts are made leaving stubs without buds, these do not heal properly, remain weak and finally die. In thinning out, it is proper to make a clear smooth out flushed with the surface of the limbs from which they arise for facilitating quick healing.

### Season of pruning

Climate has significant role in pruning. Different plant species grow in different climate zones and are required to be pruned differently depending upon the types of plant and specific purpose. As far as muga food plants are concerned, the ideal time for pruning is during dormant period i.e., between January and March, particularly for soalu. The reason for this practice is that the plants normally have a good supply of stored food at the end of the growing season. This stored food enables the tree to resume growth and recover more quickly from the effect of pruning.

Further, during the dormant period food plants are more or less leafless (due to deciduous nature) and the sap level is comparatively down. The movement of sap becomes very fast during growth period (Spring/rainy) and if the plants are pruned during this phase, considerable bleeding results in. In order to prevent this vital loss of nutrients, the food plants should be subjected to pruning during dormant period. Unlike soalu, pruning can be practised at any time in som plantations owing to its evergreen nature. However, irrigation is needed

during dry months for proper sprouting and growth of foliage.

### Pruning schedule for som

Muga silkworm is multivoltine in nature having 6 or even more crops in a year due to overlapping of generation. Pruning once in a year does not provide suitable leaf for each rearing. Hence, to synchronize leaf to each silkworm rearing a pruning schedule has been formulated by resorting to monthly pruning for different silkworm rearing in order to get quality foliage.

It was observed that plants pruned during summer months were ready for early and late stage rearing after 3 and 4 months while it was 4 and 5 months respectively in winter pruned plants (Table).

The formulated pruning schedule was confirmed by repetitive silkworm rearing in different crops.

### Care to be taken

One has to be very clear that continuous pruning has adverse effect on the plant and foliage yield. Hence, plants should be pruned once in a year.

### Pre-pruning care

- ☐ The cuts made are injuries to the plant. Hence, care should be taken to minimise the damage because injured regions become susceptible to various types of infection.
- ☐ The cut should be oblique and antidirection of sun-rise.
- ☐ The cut region should be clean without any cracks.
- ☐ The bark around the cut should be intact without any peels.
- ☐ For sharp, good and ideal pruning, saw and sickle should

be used.

### Post-pruning care

- ☐ Application of fungicide to cut end (baistin, Phytolon etc.)
- ☐ Application of paste of cowdung, mud and BHC 10% dust on cut end.
- ☐ Lime washing.
- ☐ Application of NPK @ 50:25:25 preferably prior to pruning.
- ☐ Irrigation of the pruned plant if there is no rain after application of fertilizer.

### Impact of pruning

The formulated pruning schedule technology has been transferred to extension centres, muga seed development projects and progressive farmers field in the N.E. region. The following results/feedback indicated the excellent performance of pruning schedule :

- ☐ Production of quality foliage has helped in rapid growth of worms.
- ☐ Larval duration has decreased to 18 days as compared to 21 days during summer rearing.
- ☐ Effective rate of rearing (ERR %) has increased as high as to 92% in comparison to 50% in unpruned plants.
- ☐ Cocoon dfl ratio has increased to 1:80 as compared to 1:50.
- ☐ Dfl: Dfl ratio has shot upto 1:49 as compared to 1:30
- ☐ Average fecundity has also gone up to 215 no. egg per dfl from 150.
- ☐ Larval weight has increased from 8 to 10 g. However, silk ratio has remained between 9 and 10%.

**The authors are with Regional Muga Research Station, Boko, Kamrup, Assam.**

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# Ecological Issues and Silk Industry

G.S. Nadiger

India has the unique distinction as the second largest producer of mulberry silk besides producing the other three non-mulberry varieties viz. Tasar, Eri and Muga. She is also the largest consumer and importer of raw silk. The development of silk industry in India has been with two objectives viz. rural employment generation,

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***Eco-friendly concept is the key word in the international business arena and silk industry is not an exception to this universal phenomenon. The Government of India has also taken some concrete measures to equip the silk industry to meet the international standards of eco-testing. The author dovetails the preparedness of the industry to face this global concern squarely.***

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and besides meeting the increasing domestic demand, foreign exchange earning through the advantages of traditional artisan vigour for producing unique designs. However, the share of product mix viz., traditional products,

printed and other dress material varieties, and hi-tech products has been rapidly changing indicating thereby the change in the consumer requirements.

Comparative advantages of silk industry in the past have been associated with low productivity and moderate quality with labour oriented traditional/intermediate technology. Under the liberalisation, privatisation and globalisation (LPG) era, industry has to face the challenges of competitive advantages of high quantity and productivity through the application of modern techniques.

In addition, ecological considerations have been brought to the forefront in the marketing of consumer goods including textile all over the world. Exporters of textile goods must, therefore, be in a position to adopt their products and producing techniques to comply with new environmental regulations being introduced in their target/niche markets.

## **Ecological considerations**

Ecology is the study of the interaction between plant, animal and their interface with the environment. In the context of silks three areas have been suggested.

- Production ecology includes cultivation of mulberry and other food plant, application of fertilizer, growth regulators, crop protection against pests using pesticides and harvesting of silk cocoons (sericul-

ture); manufacture of raw silk, twisted threads and fabrics (reeling throwing, and weaving); and chemical processing i.e. degumming, bleaching, dyeing/printing and finishing, use of dyes and chemicals.

- User ecology includes the effect of clothing textiles and the substances that give aesthetic comfort values and functional qualities besides hygienic environment.
- Disposal ecology includes biodegradable features of all the ingredients along with fibre and effluent and waste/bye-product disposal with least impact on the environment.

It has been now realised that a number of dyes and chemicals being used in the industry contain toxic and hazardous substances which affect the consumer and cause irreparable damage to the environment. Germany took the lead in imposing ban on the use of azo dyes containing harmful amines in the textile production which has come into effect from 1.4.1996. The Netherlands has also imposed a similar ban from 1.8.1996. Phasing out was permitted till 1.9.1997. Government of India also banned manufacture of a number of dyes through the notification dated March 26, 1997. In other words, the above regulatory considerations need to be attended by the different players in the industry by adopting appropriate action/strategies.

## Banned dyes

Azo dyes constitute the largest and most varied group of synthetic organic dyes with the fullest/wide shade range. Economy and easy manufacturing processes have led to faster growth of the azo dyes although fastness properties considerably vary. When some of the azo dyes undergo reduction, reaction, they will split into two components, of which one is aryl amine. Some of these aryl amines

are reported to be toxic or carcinogenic in nature. However, in the present context 22 amines are banned as harmful as per German Legislation (Table-1) which the following 4 amines have been proved to be carcinogenic.

4 - Amino diphenyl,  
Benzidine,  
4-Chloro-O-toluidine,  
2-Naphthylamine.

The remaining 16 amines are also having carcinogenic and other harmful effects on the human skin as per the experiments conducted recently. Yet, another two amines suspected to be carcinogenic are P-Amino azo benzene and 2-Methoxy Aniline.

All the 22 amines are banned as per the German Legislation, however all these amines are not released from the 118 banned dyes by Government of India (Indian ban- Table-2) in fact only 12 of the 22 banned amines are released from these banned dyes.

## Banned chemicals

Following chemicals which are employed in the textile production are banned:

Formaldehyde  
Toxic Pesticides  
Pentachlorophenol  
Heavy metal traces  
Halogen carriers  
Chlorine bleaching.

Table-3 gives the summary of the Eco-standards enunciated by various countries including India.

## Eco-friendly consideration

The main issues as far as the industry is concerned are the prohibition of the use of certain dyes and textile auxiliaries/chemicals containing these banned amines and other toxic substances and the application at different stages is observed in organised and unorganised sectors. Perhaps, use of banned pesticides in the seri-

culture industry needs special address for compliance. Similarly, the special considerations in the processing industry is the need of the hour. Some of the following points may be kept in view during processing of silk.

**Pre-treatment processes:** These include degumming and bleaching. Degumming is mostly carried out using soap, soda, ash and/or surfactants which appear to involve no ecological problems at present. Bleaching is not generally adopted for deep shades. However, for lighter shades it is employed. Bleaching is mostly done using alkaline peroxide or sodium hydrosulphite. Organic stabilizers could be used as against sodium silicate used at present. Similarly, neutralisation using acetic acid gives rise to high biological oxygen demand (BOD) and needs to be replaced by other neutralising agents having low BOD. After bleaching, some of the optical brighteners based on still bene are used and these appear to be safe.

**Dyeing:** Dyeing of silk is mainly carried out in small scale units using acid, metal complex, direct and basic dyes. Some of them are azo dyes and on reduction form one of banned amines. Nearly 30% of these dyes are banned and replacement for them is available. However, new recipe, has to be worked out by the dyeing units and involve increase in the cost of dyeing. Reputed dye manufacturers give the certified dyes which on use may not pose the problem. In mordant dyeing, chromium salt is employed which has to be totally avoided. Reactive dyes are safe and do not likely to form banned amines but there will be an increase in the cost of dyeing. Care needs to be taken to minimise water pollution problems.

**Printing:** Selection of the dyes in respect of acid, acid mordant

**Table 1. List of 22 amines banned by Germany**

4-Amino biphenyl 1 (CAS-No.: 92-67-1)
Benzidine (CAS-No.: 92-87-5)
4-Chlor-o-toluidine (CAS-No.: 95-69-2)
2-Naphthylamine (CAS-No.: 91-59-8)
p-Chloroaniline (CAS-No.: 106-47-8)
2,4-Diaminoanisole (CAS-No.: 615-05-4)
4,4-Diamino diphenyl 1 methane (CAS-No.: 101-77-9)
3,3-Dichloro benzidine (CAS-No.: 91-94-1)
3,3-Dimethyl benzidine (CAS-No.: 119-90-4)
3,3-Dimethyl 1 benzidine (CAS-No.: 119-93-7)
3,3-Dimethyl 1-4,4'-diamino diphenyl 1 methane (CAS-No.: 838-88-0)
p-Cresidine (CAS-No.: 120-71-8)
4,4'-Methylene-bis-(1-chloraniline) (CAS-No.: 101-14-4)
4,4'-Oxydianiline (CAS-No.: 101-80-4)
4,4'-Thiodianiline (CAS-No.: 139-65-1)
o-Toluidine (CAS-No.: 95-53-4)
2,4,5, Diamino toluene (CAS-No.: 95-80-7)
2,4,5,-Trimethyl 1 aniline (CAS-No.: 137-17-7)
o-aminoazotoluene (CAS-No.: 97-56-3)
2-amino-4-nitrotoluene (CAS-No.: 99-55-8)
Amino azo benzene.
2-methoxy Aniline.



**Table-2. List of Prohibited Dyestuffs by Government of India**

S. No.	C.I. Generic	Name	C.I. No.	Diazo-components
1.	Acid	Orange 45	22195	B
2.	Acid	Red 4	14710	O-An
3.	Acid	Red 5	14905	O-An
4.	Acid	red 24	16140	O-T
5.	Acid	Red 26	16150	
6.	Acid	Red 73	27290	p-Aab
7.	Acid	Red 85	22245	B
8.	Acid	Red 114	23635	T
9.	Acid	Red 115	27200	o-A
10.	Acid	Red 116	26660	p-Aab
11.	Acid	Red 128	24125	O-A
12.	Acid	Red 148	26665	A
13.	Acid	Red 150	27190	P-Aab
14.	Acid	Red 158	20530	o-T
15.	Acid	Red 167		T
16.	Acid	Red 264	18133	o-An
17.	Acid	Red 265	18129	o-T
18.	Acid	Red 420		p-Aab
19.	Acid	Violet 12	18075	o-An
20.	Acid	Violet 49	42640	
21.	Acid	Brown 415		o-An
22.	Acid	Black 29		B
23.	Acid	Black 94	30336	B
24.	Acid	Black 131		o-An
25.	Acid	Black 132		o-An
26.	Acid	Black 209		T
27.	Azoic	Diazo Component 11	37085	C
28.	Azoic	Diazo Component 12	37105	2 A.4N.
29.	Azoic	Diazo Component 48	37235	D
30.	Azoic	Diazo Component 112	37225	B
31.	Azoic	Diazo Component 113	37230	T
32.	Basic	Red 11		p-Aab
33.	Basic	Red 42		o-An
34.	Basic	Brown 4	21010	2,4-T
35.	Developers 14=Oxidation	Base 20	76035	2,4-T
36.	Direct	Yellow 1	22250	B
37.	Direct	Yellow 24	22010	B
38.	Direct	Yellow 48	23660	T
39.	Direct	Orange 1	23370	B
40.	Direct	Orange 6	23375	T
41.	Direct	Orange 7	23380	T

and direct dyes may be done similar to the dyeing. Vat dyes, reactive dyes and pigments (till April 1998) may be used safely for printing. Gum based thickeners used for printing shall not contain Pentachlorophenol as preservative. In case of gums, dry powders without preservative may be used or preservatives which are permitted may be added to maintain the viscosity for a week. Use of kerosene in pigment printing shall be avoided. Recently ATIRA has developed technology for manufacture of thickener and binder to replace kerosene which could be considered.

*Finishing:* Although, finishing as a concept is not widely employed in silk sector, some chemical application is employed by the industry. Some cationic compounds and antilame compounds have to be addressed. Tin weighing should not be done. All formaldehyde oriented finishes should be avoided. Biodegradable chemicals employed for finishing may be called eco-friendly.

*Effluent treatment and disposal:* Over and above, use of the eco-friendly chemicals and dyes, eco-friendly processing is of prime consideration for ecological equilibrium. Waste water, if contains the above chemicals, high solid content and high level of BOD and COD would endanger the life of plant and animals including human beings. It is, therefore, necessary to take adequate measures so that total dissolved solids is low (less than 2100 PPM), BOD and COD is minimal. Absence of the colourant and pH within the permissible limits are essential. In other words, effluent treatment is a must.

*Others:* With an intention to manufacture eco-friendly silks, vegetable dyes are employed with certain mordants. Some of the

42.	Direct	Orange 8	22130	B
43.	Direct	Orange 10	23370	T
44.	Direct	Orange	29173	o-T
45.	Direct	Red 1	22310	B
46.	Direct	Red 2	23500	T
47.	Direct	Red 7	24100	D
48.	Direct	Red 10	22145	B
49.	Direct	Red 13	22155	B
50.	Direct	Red 17	22150	B
51.	Direct	Red 21	23560	T
52.	Direct	Red 22	23565	T
53.	Direct	Red 24	29185	o-An
54.	Direct	Red 26	29190	o-An
55.	Direct	Red 28	22120	B
56.	Direct	Red 37	22240	B
57.	Direct	Red 39	23630	T
58.	Direct	Red 44	22500	B
59.	Direct	Red 46	23050	DcB
60.	Direct	Red 62	29175	o-T
61.	Direct	Red 67	23505	T
62.	Direct	Red 72	29200	o-An
63.	Direct	Violet 1	22570	B
64.	Direct	Violet 12	22550	B
65.	Direct	Violet 21	23520	T
66.	Direct	Violet 22	23480	B
67.	Direct	Blue 1	24410	D
68.	Direct	Blue 2	22590	B
69.	Direct	Blue 3	23705	T
70.	Direct	Blue 6	22610	B
71.	Direct	Blue 8	24140	D
72.	Direct	Blue 9	24155	D
73.	Direct	Blue 10	24340	D
74.	Direct	Blue 14	23850	T
75.	Direct	Blue 15	24400	D
76.	Direct	Blue 22	24280	D
77.	Direct	Blue 25	23790	T
78.	Direct	Blue 35	24145	D
79.	Direct	Blue 53	23860	
80.	Direct	Blue 76	24411	D
81.	Direct	Blue 151	24175	D
82.	Direct	Blue 160		D
83.	Direct	Blue 173		D
84.	Direct	Blue 192		D
85.	Direct	Blue 201		D
86.	Direct	Blue 215	242115	D

mordants such as chromium salts are under the list of banned chemicals. Processing water sometimes gives rise to the presence of these elements in traces. More importantly, the pure zari yarn sometimes carries traces of chromium which is hazardous in nature.

### Strategic management

Silk industry involves a number of players like sericulture farmers, reelers, weavers, chemical processors (dyers & printers), dyestuff and textile chemical manufacturers, exporters and traders. They are again found in different sectors like tiny, small medium and, in a limited way, large. Under the circumstances, silk sector largely depends on the support system for technical assistance. While professional organisations like dyestuff manufacturers, textiles etc. do catalyze to create awareness and confidence in a limited way, testing of the material as per international and national standards has to be done through infrastructure development. A number of seminars/workshops/awareness camps have been conducted by Textiles Committee, Export Promotion Councils, Central Silk Board and State support systems. It is felt that the industry is having satisfactory awareness of the issue involved in the non-tariff barriers. However, education being a continuous process, such activities need to be sustained.

In order to meet the challenges posed due to the implementation of eco-regulations by Germany and other countries, the Government of India through Ministry of Textiles chartered a two-pronged approach viz., regulatory and developmental. Since 1990, the ban on handling of benzidine based dyes, notification of Indian



87.	Direct	Blue 295	23820	T
88.	Direct	Green 1	30280	B
89.	Direct	Green 6	30295	B
90.	Direct	Green 8	30315	B
91.	Direct	Green 8.1		B
92.	Direct	Green 85	30387	T
93.	Direct	Brown 1	30045	B
94.	Direct	Brown 1:2	30110	B
95.	Direct	Brown 2	22311	B
96.	Direct	Brown 6	30140	B
97.	Direct	Brown 25	36030	B
98.	Direct	Brown 27	31725	B
99.	Direct	Brown 31	35660	B
100.	Direct	Brown 33	35520	B
101.	Direct	Brown 51	31710	B
102.	Direct	Brown 59	22345	B
103.	Direct	Brown 79	30056	B
104.	Direct	Brown 95	30145	B
105.	Direct	Brown 101	31740	B
106.	Direct	Brown 154	30120	B
107.	Direct	Blue 222	30368	T
108.	Direct	Black 4	30245	B
109.	Direct	Black 29	22580	B
110.	Direct	Black 38	30235	B
111.	Direct	Black 91	30400	D
112.	Direct	Black 154		T
113.	Disperse	Yellow 7	26090	p-Aab
114.	Disperse	Yellow 23	26070	p-Aab
115.	Disperse	Yellow 56		p-Aab
116.	Disperse	Orange 149		p-Aab
117.	Disperse	Red 151	26130	p-Aab
118.	Disperse	Blue 1	64500	

Arylamines which can be released by the listed azo-dyestuffs

o-A	:	o-Aminoazotoluene (III A2)
p-Aab	:	p-Aminoazobenzene (III A2)
o-An	:	2-Methoxyaniline (II A2)
2-A-4-N	:	2-Amino-4-nitrotoluene (III A2)
B	:	Benzidine (III A1)
C	:	4-Chlor-o-toluidine (III A1)
D	:	3,3-Dimethoxybenzidine (III A2)
DcB	:	Dichlorobenzidine (III A2)
N	:	2-Naphthylamine (III A1)
o-T	:	o-Toluidine (III A2)
T	:	3,3-Dimethylbenzidine (III A2)
2,4-T	:	4, Methy 1-1,3-phenylenediamine (III A2)s

Eco-Standards and prohibition of manufacture/handling of 70 more dyes containing various aryl amines recently, are some of the regulatory measures taken by the Government of India.

Ministry of Textiles, as part of the developmental efforts, directed various support system organisations to arrange educative seminars/workshops and camps to inculcate eco-friendly concepts among the industry and consumers. Likewise, as a part of the support to the industry the Ministry took up a massive programme of upgradation/setting up of eco-testing facilities by sound planning after getting the feed back by instituting a number of studies, sectorwise and obtaining a general consensus on the strategies to be evolved.

A number of laboratories have been operating to support the industry (Table-4) under the consortium of eco-laboratories under Ministry of Textiles with Textiles Committee, as nodal agency. The active efforts by all the member laboratories to provide testing and other technical support as per international standards have already started yielding positive results.

Under the circumstances, it is suggested to have a three-tier approach to contain the eco problems - detection, prevention/correction, and validation. While detection and validation could be done on the process/product by way of testing at any one of these laboratories, prevention/correction is essentially to be done by the industry.

International buyers have been approaching some of these laboratories for assistance in testing and identifying the entrepreneurs meeting the eco-friendly norms. It is, therefore, suggested that Indian buyers and entrepreneurs also

**Table-3. Summary of eco-standards for permitted levels of harmful substances on silk textiles**

- A. Pesticides – total less than 1 ppm and individual less than 0.1 ppm.
- B. Pentachlorophenol less than 0.5 ppm.
- C. Fomaldehyde – baby clothing less than 20 ppm, Undergarments less than 75 ppm and Outer garments less than 300 ppm.
- D. Heavy metals As, Pb, Cd, Hg, Cu, Ca, Cu and Zn – totally banned and should not be present.
- E. Azo dyes which are likely to release any of the specified amines on standard reduction test should be avoided and by standard test the liberated amine shall be less than 30 ppm (sum total).

make an action plan so that the vital non-tariff barriers are also attended timely thereby augmenting the export business.

Finally, the confirmative test for the absence of the banned items in the final product can be done through sophisticated instruments at the testing laboratory and to validate the product as eco-friendly product. Eco-friendly process needs thorough eco-audit

of the processing house conforming to ISO 14000.

### Environmental management system standards

Similar to the ISO 9000 Quality Management System standards which are the equivalent of the British Standard BS 5750, an environment management system standards has been formulated during 1994 by British Standards

as BS 7750 – 1994. There are in all 11 environmental management system requirements to be fulfilled by a mill/processing unit to get certification under the standards. These elements are environment management system, environmental policy, organisations and personnel, environmental effects, environmental objective and targets, environmental management programme, environmental management manual and documentation, operational control, environmental management records, environmental management audits and environmental management review.

While eco-labelling scheme is targeting the product, the environmental management and audit systems (EMAS) is applicable to textiles unit. Eco-auditing is the assessment of the textile units with regard to their conformance with norms/criteria stipulated in respect of certain eco-parameters.

Non-tariff barriers like banned chemicals, dyes and eco-friendly processing technique are going to be the integral part of the industrial operation under the changing socio-cultural and economic environment. This applies to both domestic and export fronts. Therefore, timely measures are to be taken by the industry. While support system organisation viz., the research organisations and other developmental agencies reinforce the use of eco-friendly chemicals, dyes, fibres and employing eco-friendly process, the industry needs to make use of the chain DETECTION – PREVENTION/CORRECTION – VALIDATION. In the long term interest, introduction of ISO 9000 Quality Management Systems and ISO 14000 Environmental Management Systems is also welcome.

**The author is Director (Lab.), Textiles Committee, Mumbai.**

**Table-4. Eco-Laboratories under the Consortium of Eco-Laboratories, Textiles Committee, Ministry of Textiles, Government of India, upgraded/set up during the year 1995-96 and 1996-97**

S. No.	Name of the Organisation	Details of Eco-Labs set up/ upgraded in different cluster	Total No.
1.	ATIRA	Ahmedabad (Grade-A)	1
2.	BTRA	i) Mumbai (Grade-A) ii) Ichalkaranji (Grade-E)	2
3.	CSTRI	i) Bangalore (Grade-A) ii) Bhagalpur (Grade-A)	3
4.	IIT	Kanpur (Grade-E)	1
5.	IJIRA	Calcutta (Grade-A)	1
6.	MANTRA	Surat (Grade-A)	1
7.	NITRA	Ghaziabad (Grade-A)	1
8.	SITRA	Coimbatore (Grade-A)	1
9.	Textile Committee	i) Cannanore (Grade-A) ii) Chennai (Grade-A) iii) Jaipur (Grade-A) iv) Ludhiana (Grade-A) v) Madurai (Grade-A) vi) Mumbai (Grade-A) vii) New Delhi (Grade-A) viii) Tirupur (Grade-A)	8
10.	WRA	Thane (Grade-A)	1

**Grade A:** Fibre, Yarn, Fabric, Analytic, Dyes/Pigments, Colour Fastness, Effluents and Eco-specifications.

**Grade E:** All Eco-specifications.

**Note:** All the above mentioned laboratories are catering to the physical, chemical, quality and eco-testing needs of all types of fibres in the respective catchment areas.



# Identification of Defects in Silk Fabrics

S.S. Manna

In India, weavers of small and large sectors are responsible for producing silk fabrics. Commercial values of silk fabrics particularly the costlier ones depend on the defect-free quality of the cloth. It will be helpful for weavers and persons in the trade to have a reason based knowledge of occurrence of such defects and their prevention.

Weaving of defect-free fabrics

is difficult. Certain defects spoil the piece are called *major* while *minors* do not. For exports, however, most of the minor defects are not allowed. Defects in (a) fabrics woven with single yarns and (b) dyed fabrics with light shades or undyed ones are more visible than those of (i) fabrics woven with double twisted yarns and (ii) dyed fabrics with deep colours. A few

defects can be mended to some extent on the loom itself or at the folding section of the mill.

The common defects in fabrics, which originate from faulty weaving mechanism and its accessories are given in the Table. These defects are more in powerlooms than in handlooms and are equally applicable for cotton woven clothes also.

Major Defects			
Defects	Characteristics	Possible reasons	Remedies
(1)	(2)	(3)	(4)
Smash	Breakage of several warp ends in groups, together and in a place.	Shuttle flying and trapping, excessive warp tension, improper shedding or dwell in shed, balance of shuttle, faulty picking, broken pickers, worn out swells, improper functioning of swell springs, check strap, reed-box-slay alignment, chipped-off shuttle, coming out of shuttle peg or pin shuttle tongue loose in peg, pim comes out, slough off, etc.	<ul style="list-style-type: none"> <li>• Check the points and rectify.</li> <li>• Cut the beam and get a new one.</li> <li>• For smaller smashes, ends can be knotted and drawn. Projected ends are to be cut down and mended with metal comb.</li> </ul>
Floats	Floating one or more number of threads of one kind (end/pick) over the another (pick/end). No interlacements.	Improper shedding, inadequate dwell, broken heald wires or its eye broken, shoots fall on warp due to improper cleaning of machine or the roof of the shed, beam apron missing, broken and unattended warp ends, improperly knotted and projected warp threads.	<ul style="list-style-type: none"> <li>• Check the points and rectify.</li> <li>• Adopt preventive measures by cleaning the machine and shed.</li> <li>• Use beam apron.</li> <li>• If the float is small, mend it by metal comb.</li> <li>• A few wefts can be removed by metal comb, till the float is cleared and weaving can be started afresh by releasing a bit of take up.</li> </ul>
Cracks	Longitudinal void spaces formed in warp or weft direction	Missing ends, missing picks, bent or broken dent wires, improper let-off and take-up, faulty grip of fillets of the emery roller, loose reed in reed cap, worn out crank or crank arm pin, cut/broken shuttle eye, bigger wound pirms used in shuttles, loose shuttle tongue in the peg, improper setting of front box wall, worn out slot in front of the shuttle.	<ul style="list-style-type: none"> <li>• Check the points and rectify.</li> <li>• In case of ends missing in beams, extra warp bobbins can be used at the back of the loom and drawn.</li> <li>• The defect can be mended to some extent by the use of metal comb.</li> <li>• Remove a few weft alternatively till the crack is gone. Then start weaving afresh by relasing a bit of take-up.</li> <li>• Such fabrics if otherwise not mendable, may be dyed with dark colours to hide the defects.</li> </ul>

Defects	Characteristics	Possible reasons	Remedies
(1)	(2)	(3)	(4)
Temple marks	Prominent pin holes with the fabric being torn at few pin points, near one or both selvages.	Faulty setting of temples, temple rings or rollers not rotating freely due to accumulated dusts or worn out parts/rusts in its bearings. Excessive cloth tension and excessive jerky operation of the weaving machine.	<ul style="list-style-type: none"> <li>Periodical maintenance of rollers/ rings of the temples.</li> <li>Ensure smooth running of machine.</li> <li>Proper depth of shed is to be maintained.</li> </ul>
Less width	Woven fabrics with less width than required.		<ul style="list-style-type: none"> <li>The beam width is to be checked. Allowance in width (1 to 1.5) inches more than the cloth width with required number of threads are to be given in the beam keeping in view of the weave pattern and reed in use.</li> </ul>
Uneven cloth	Thick and thin places in the body of the fabric. Cloudy cloth.	Erratic let-off or take-up motion, improper grip by fillets of emery roller, reed loose in reed cap or stop rod, crank-arm, loose crank pin, loose slay in the stud, use of weft of mixed denier and non-uniform silk yarn. Improper shedding.	<ul style="list-style-type: none"> <li>Check and rectify points as mentioned in (3).</li> </ul>

#### Minor Defects

Reed marks	Long straisons or open space in the warp direction.	Bent or broken reed wires, wrong denting of ends per dent in the body of the fabric.	<ul style="list-style-type: none"> <li>Check and rectify as per column (3).</li> <li>Reeds can be repaired on the loom itself by removing slay cap, by pliers.</li> <li>If irreparable, the beam has to be cut down.</li> </ul>
Reedy cloth or bad cover	Straisons in warp direction, ends tend to group in pairs. General look or cover of the fabric is bad.	Improper shedding, non-uniform tension of the two dividing warps, improper depth of shed.	<ul style="list-style-type: none"> <li>Check and rectify shedding, its depth and warp tensions of two dividing warps.</li> <li>Use tug-band from 1st lease rod to slay cap.</li> </ul>
Defective selvage	Selvage floats, bad selvage, broken or missing selvage ends, crimping of selvage ends.	Wrong temple setting, improper timing of picking and shedding, improper dwell, wrong picking force, loose selvage ends in the beam etc.	<ul style="list-style-type: none"> <li>To check and rectify as per (3).</li> </ul>
Faulty cloth	Rarely tiny or minute blisters or eruptions in the form of rashes in the body of the fabric.	Faulty shedding, un-even warp tensions for the two dividing warps, depth of shed, improper dwell, excessive jerky motion of the machine, non-use of the tug-band, wrong picking timing etc.	<ul style="list-style-type: none"> <li>To check as per (3).</li> </ul>
Slubs	Occasionally thick patches or lumps on the cloth.	Slubs in silk yarn and its cleanness defects are responsible.	<ul style="list-style-type: none"> <li>To take preventive measures as per (3).</li> </ul>
Double ends or picks	Often the fabric is seen running with double ends or double picks.	Wrong drawing in the health eye, wrong denting in dents. Wrong shuttle changings.	<ul style="list-style-type: none"> <li>To take preventive measures as per (3).</li> <li>When a pick is broken, the particular shed is to be found out and fresh shuttle to be put in from the point where the pick is broken, weaving may be started afresh by releasing a bit of take-up.</li> </ul>

**The author is with CSRTI, Berhampore, West Bengal.**

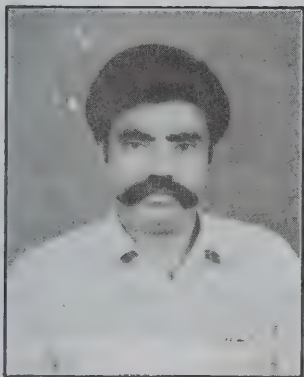
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# Nothing Succeeds like Success

T.G. Rajappan and T.V. Vathsala



**Shri Rajeevalochana Reddy**

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***Sericulture is flourishing in dry regions like Ananthpur district of Andhra Pradesh in the recent years. The credit should go to farmers like Shri Rajeevalochana Reddy of Gorantla, who are enthusiastic and innovative by nature. Indian Silk peeps into the success of Shri Reddy, a graduate and an adopted progressive rearer of the State Govt. Excerpts.***

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***Sericulture - scaling new heights***

**R**ajeevalochana Reddy's verve and quest for experimenting new technologies have catapulted him to an enviable position of success in sericulture within a short span of five years. His phenomenal success leaves one in consternation and gaping considering the fact that he is comparatively a novice in the sphere, switching over from his traditional cultivation of paddy and sugarcane to sericulture.

Shri Reddy, hailing from Gorantla, Ananthpur district of Andhra Pradesh is neither a traditional rearer nor a strict practitioner of the stipulated norms for pursuing sericulture. Yet, he has been reaping bountiful crops year after year exploding the oft-re-

vered myth that successful sericulture is the domain of traditioners.

What lured him to sericulture from his traditional cultivation of paddy and sugarcane? We were perforced to ask. Pat came the reply, "My own observation of the surroundings, frequent visits to the State Department of Sericulture and Seed Cocoon Procurement Centre (CSB) prompted me to take to sericulture". He adds, "the persuasion on the part of DOS officials also influenced my decision to switch over to sericulture as it is more beneficial".

Shri Reddy, an experimenter of new technology, is an adopted progressive farmer of DOS. He also visits Seed Cocoon Procurement Centre, CSB, Gorantla for

counselling and getting acquainted with the latest in sericulture.

Shri Reddy began his odyssey with sericulture by cultivating mulberry in one acre of land. The instant success has served as a shot in the arm for further expanding the activities. The lush and green mulberry field of four acre speaks for itself the pace with which he expanded the activity within a period of 4 years. Initially, he brought mulberry cuttings from Hindupur. His preferred variety is  $M_5$  in 2'x2' row system.

Gorantla is a dry zone where water is a scarce commodity. To overcome this problem, Shri Reddy has dug borewell to irrigate the crop. He faces no water problem but power shortage in summer. The average leaf yield is 25 kg/acre, the highest being 40 kg at times.

"Not a particular fertilizer is used; instead it is changed every crop", Shri Reddy says. He uses FYM, sulphate and other complex fertilizers. He does not use urea as he thinks, "it reduces water content of mulberry leaves and promotes only vertical growth. Manuring is done at the time of pruning. He is trying to adopt vermiculture".

Shri Reddy has a penchant for experimenting new technologies and at the same pursuing the profession with his own reasoning and knowledge. So far, he has not used any pesticide. However, he intends to use 'Nuvacron' to contain the pests in his garden.

Shri Reddy has a strong conviction that a person should have sufficient money and innovative ideas to experiment new technologies. He says, "Ideas I have and I get adequate returns from sericulture".

He started the rearing with 200 dfls and today he rears about 600 dfls. He has achieved a cocoon yield of 33 kg/100dfls against the highest target of 25 kg fixed by the Govt. of Andhra Pradesh. He purchases layings of Pure Mysore from DOS, Gorantla which buys back his entire production.

Shri Reddy's rearing house is a unique one. It is 15 feet high to facilitate air circulation and to control temperature. Likewise, rearing stand is 5 feet more than the normal. He uses three ante-chambers to ward off uzi menace, a technique of his own. Besides, he uses 'uzi' tablets. During summer, temperature is controlled by covering the roof with coconut thatches and sugarcane pulp and also by keeping the roof wet.

Shri Reddy has not faced any crop failure so far. This has given him the much needed confidence and courage to further expand his activity.

Recently, he has constructed a new rearing house and intends to expand mulberry cultivation to another two acres. He also plans to experiment with 'Anantha', a new mulberry variety.

On an average, he harvests five crops in a year. He disinfects the crop with 'Vijetha', developed by CSB. He is the only state adopted farmer who is getting 'Vijetha' though in a limited quantity. Convinced by its efficacy, he demands more quantity of 'Vijetha'.

Shri Reddy is presently toying with the idea of reducing the number of feeds as part of his experiment with the recommendations of CSB and DOS to increase the production of cocoons. From earlier four feeds a day, it has been reduced to three and he wants to go for two feeds only to facilitate more layings.

"Sericulture is a profitable venture", avers Shri Reddy and adds, "provided it is pursued with personal interest and reasoning. One should also plough back a certain amount of income earned out of it for development activities conforming to the latest technology. Shri Reddy frankly admits that he earns a total profit of Rs. 80,000/- per annum. His avocation provides 96 mandays of employment in the areas of ploughing, leaf plucking, feeding, cleaning, etc. for rearing 600 dfls.

Shri Reddy is a progressive farmer of the state Govt. who was awarded Rs. 5000/- as an incentive and also nets worth Rs. 500/-. He intends to avail of the loan facility for construction of modern rearing sheds and to increase rearing capacity from 600-1500 dfls. He is also an active member of the State Sericulture Farmers Association.

Shri Reddy articulates some suggestions and advice to be a successful sericulturist.

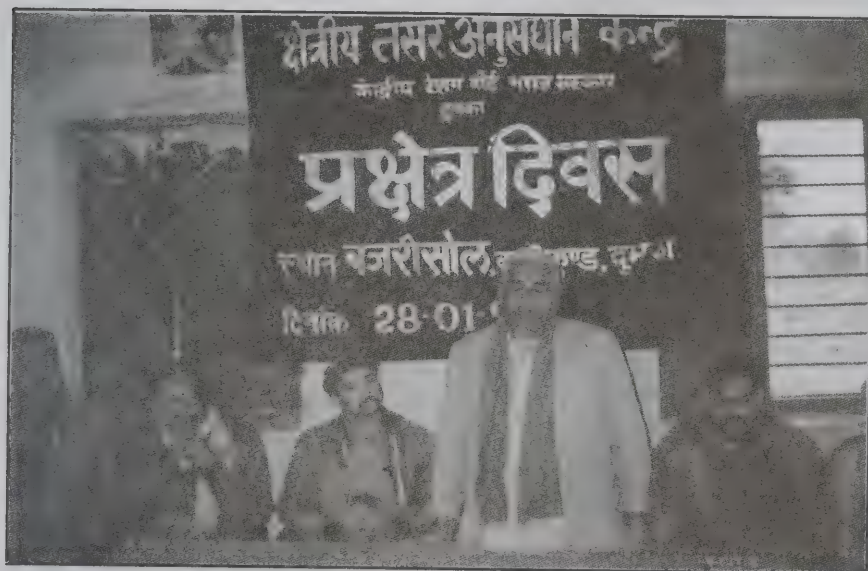
- One should be interested and devoted.
- Better leaf quality naturally leads to a good crop.
- Leaf quality should be maintained.
- Rich and good layings are a must.
- Garden should be irrigated adequately.
- Govt. should provide improved variety of mulberry/seed.
- Pest invasion should be detected in time.
- Adequate care should be taken while using pesticides.

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*The authors are with Indian Silk, CSB, Bangalore. Inputs from Ch. Satyanarayana Raju, Asst. Director, SCPC, Gorantla, A.P.*



## Field Day on Tasar Culture



*Field day in progress*

The Regional Tasar Research Station (RTRS), Dumka, Bihar organised a field day at Bajrisole (Kathikund) on January 28, 1998 as a part of celebrating

the Golden Jubilee of India's Independence.

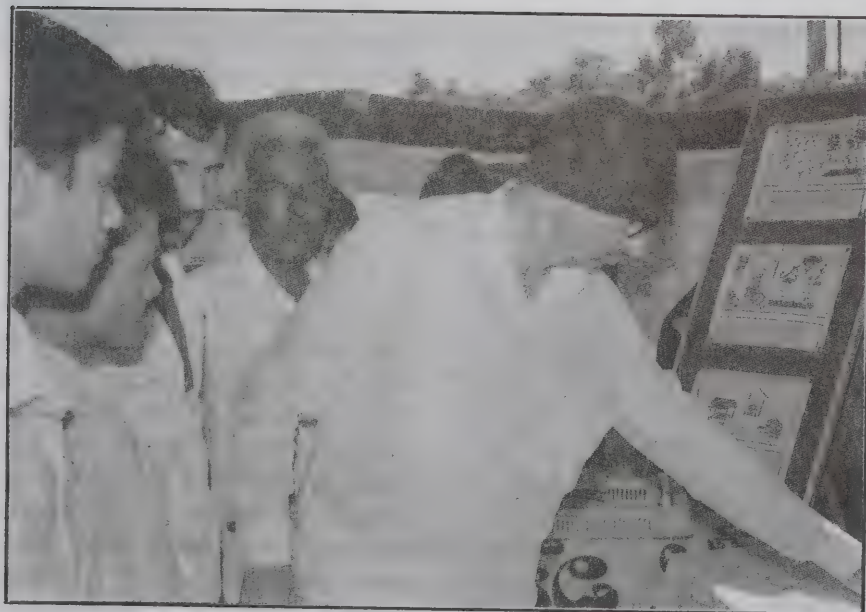
Shri Radhakrishna Das, Secretary, Kathikund Samagra Vikas Parishad (KSVP) inaugurated the

programme informed the gathering that the Parishad is going to start a training programme in reeling for the women. Shri M.K. Singh, Deputy Director, RTRS, Dumka, presiding over the function advised the farmers to adopt new technologies of tasar culture. The experts of RTRS, Dumka and BSM & TC, Kathikund explained the measures and precautions to be taken for tasar grainages and rearings.

The Branch Manager, Allahabad Bank, opined that tasar culture is the best medium for self-employment and advised the farmers to avail of the loan facilities. A total of 58 tasar farmers attended the field day.

**Report : M.K. Singh, Deputy Director, CTR&TI, RTRS, Dumka, Bihar.**

## Exhibition on New Technology



*Shri Vatal Nagaraj, MLA going round the exhibition*

An exhibition was organised at Kestur village on January 11, 1998

by the Regional Sericultural Research Station (RSRS), Chamara-

janagar to celebrate the Golden Jubilee Year of Independence in co-ordination with Department of Sericulture. The exhibition was arranged to create awareness among the farmers on the recent technological advances in the field of sericulture. The technologies like new mulberry varieties ( $S_{13}$ ,  $S_{34}$ ,  $V_1$ ) and biofertilizer, VAM, black boxing, incubation, chawki rearing, use of bed disinfectants, IPM against uzifly were displayed.

Visitors numbering more than 2000 visited the exhibition from the nearby and far off villages including Shri Vatal Nagaraj, MLA. from Karnataka Among them, more than 100 sericulturists took keen interest in the latest technologies.

**Report : V. Thiagarajan, Joint Director, RSRS, Chamara-janagar, Karnataka.**



## Farmers Meet on Tasar Culture



**Shri Sudeep Singh, IFS, Divisional Forest officer  
inaugurating the exhibiton**

A one-day Farmers' Meet-cum-Exhibition was organised to popularise the technologies of tasar culture by Regional Tasar Research Station, Jagdalpur at Madhya Pradesh Government Kosa Seed Station, Chapka, Bastar on

January 19, 1998.

The meet was inaugurated by Shri Sudeep Singh, IFS, Divisional Forest Officer, Social Forestry, Jagdalpur. He said that such programme will provide a common platform for the scientists

and the farmers to share their experiences and help to find solution to the problems.

Shri Alok Kumar Tiwari, Sub-Divisional Officer, Social Forestry called for a joint effort by Central Silk Board and Department of Sericulture to find out the problems of tasar farmers and to suggest ways and means to improve their socio-economic condition.

On the occasion, Shri A.L. Ade, Deputy Director, DOS, Shri Vijay Kumar Pande, Deputy Director and Dr. Ram Kumar, Senior Research Officer of the RTRS, Jagdalpur spoke on dissemination of technologies for promotion of tasar industry.

An exhibition on new technologies, technical session and interaction between the farmers and the scientists were the other attractions of the programme.

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**Report : Deputy Director, RTRS,  
Jagdalpur, Madhya Pradesh.**

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## State Textile Secretary's visit



Smt. Neela Satyanarayan, IAS, Secretary (Textile), Govt. of Maharashtra, visited sericulture units at Jadgaon and Goltgaon, Aurangabad district, Maharashtra on January 8, 1998 alongwith Shri T.F. Paturkar, Joint Secretary, R.O., CSB, Shri Undale, Dy. Director and Shri Navgire, Asst. Director, Sericulture, Aurangabad. The Secretary was briefed of the activities carried out in the villages and was taken to the low-cost silkworm rearing houses and apprised of the rearing technology adopted by farmers. In addition, she was also taken to the large scale sericulture unit of Shri Pandurang Salunkhe of Goltgaon.

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**Report : A.D. Jadhav, Asst.  
Director of Sericulture,  
Aurangabad, Maharashtra.**

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## Chairman Inaugurates Exhibition on Progress of Sericulture



**Shri H. Ekanthaiah, Chairman, Central Silk Board inaugurating the Exhibition at SMGS, Hosur**

Shri H. Ekanthaiah, Chairman, Central Silk Board, inaugurated a two-day exhibition on "Progress of Sericulture in India" organised by the Silkworm & Mulberry Germplasm Station, Hosur, Tamil Nadu on January 22, 1998, in commemoration of the 50 years of India's Independence celebrations. The function was attended by the local sericulture farmers, private silkworm seed producers, officers and staff of State Sericulture Department faculty members and students from various higher secondary schools. In his address, the Chairman gave a chronological account of the progress of sericulture in India.

January 22nd happens to be the 101st birth anniversary of national freedom fighter, Nethaji Subash Chandra Bose and the Chairman garlanded the portrait of Nethaji. He appreciated the scientists for their contribution in technology development, officers and staff of State Sericulture Dept. for disseminating the technology. However, he desired more intensive implementation of new technology so that silk productivity and quality will improve.

In the exhibition, various aspects of sericulture and new improvements such as progress of sericulture, exploration and collection of mulberry germplasm, mulberry cultivation practices, silkworm rearing and seed technology, reeling technology, non-mulberry sericulture and silk garments were displayed. The participants evinced interest in various technological demonstrations. Nearly 1000 people visited the stalls.

**Report : K. Thangavelu, Director, Silkworm and Mulberry Germplasm Station, Hosur, Tamil Nadu.**

## Field day on Bivoltine

In connection with the Golden Jubilee year of India's Independence, a Field Day was arranged by Research Extension Centre (REC), Angamaly in Parakadavu block of Angamaly, Ernakulam district, Kerala on January 22, 1998.

About 40 farmers of Parakadavu, Moozhikulam, Mala



and nearby areas attended the function. Senior Research Officer, R.E.C., Angamaly explained new technologies for higher productivity and labour saving. He told that mulberry cultivation and silkworm rearing is the best option to wipe out the frustration that has crept in the minds of Kerala farmers due to low price of traditional crops, such as rubber, coconut, etc.

Shri Jaizin Joseph, A.S.O. Thrissur advised the farmers to rear elite bivoltine hybrid layings during favourable seasons for higher income. Shri C.T. Antony, retired Headmaster and an enthusiastic farmer, explained his experience in silkworm rearing and recent success in bivoltine. He advised the farmers to take up bivoltine rearing for higher return. Another farmer, Shri Parameswaran, also spoke on the occasion. A visit to his well-maintained mulberry field was also arranged.

**Report : Tomy Philip, REC, Angamaly, Kerala.**

## Field Day on New Technology

A Field Day for disseminating new technologies was organised by Research Extension Centre (REC), Chitradurga, Karnataka at J.N. Kote village on January 28, 1998, in commemoration of Golden Jubilee of India's Independence. It was attended by Shri G.S. Gurusiddappa, Grama Panchayat President and practising sericulturist of J.N. Kote village and Officials from Central Silk Board and Department of Sericulture, besides over 100 sericulturists from the surrounding villages.

Dr. P.R. Koundinya, SRO, RSRS, Bangalore explained the techniques of incubation, black boxing of silkworm eggs, importance of maintenance of chawki garden, chawki rearing, personal and rearing hygiene, full disinfection of rearing house and rearing appliances by 5% bleaching powder, use of Vijetha bed disinfectant and shoot rearing techniques of late age worms, etc. Dr. Syed Nizamuddin, SRA, RSRS,



*A view of enthusiastic farmers*

Bangalore explained about the importance of soil testing, use of bio-fertilizers to increase leaf productivity and reduce cost of cultivation, use of VAM and Glycel application in mulberry cultivation. Shri Srinivasa Chetty, SEO, DOS and Shri Gurusiddappa also spoke on the need to adopt new technologies related to sericulture by the farmers. Pamphlets on new

technologies in the local language were distributed.

An exhibition was also organised on new technologies evolved by CSRTI, Mysore. A film show on bivoltine for higher yield and more income generation was screened for the benefit of farmers.

**Report : A.K. Sikdar, Joint Director, RSRS, Bangalore.**

## International Fashion Fabric Exhibition

National Institute of Fashion Technology (NIFT), New Delhi will be participating in the International Fashion Fabric Exhibition to be held in New York from April 28-30, 1998. The three-day exhibition will provide a platform for textile manufacturers, distributors, importers and exporters to showcase their products and services across USA and other countries. NIFT will exhibit the best fashion textiles from India.

The event will concentrate on silk and silk blends and a host of allied fabrics. It is expected that over 12,000 apparel manufacturers, label retailers and fashion designers will attend the show from USA and other 30 countries.

*(Source: Silknet)*

## Special Award for Outstanding Women Entrepreneurs for 1997-98

The Commission of Industries, Government of National Capital Territory of Delhi, CPO Bldg., Kashmere Gate, Delhi has instituted special awards to the outstanding Women Entrepreneurs for the year 1997-98.

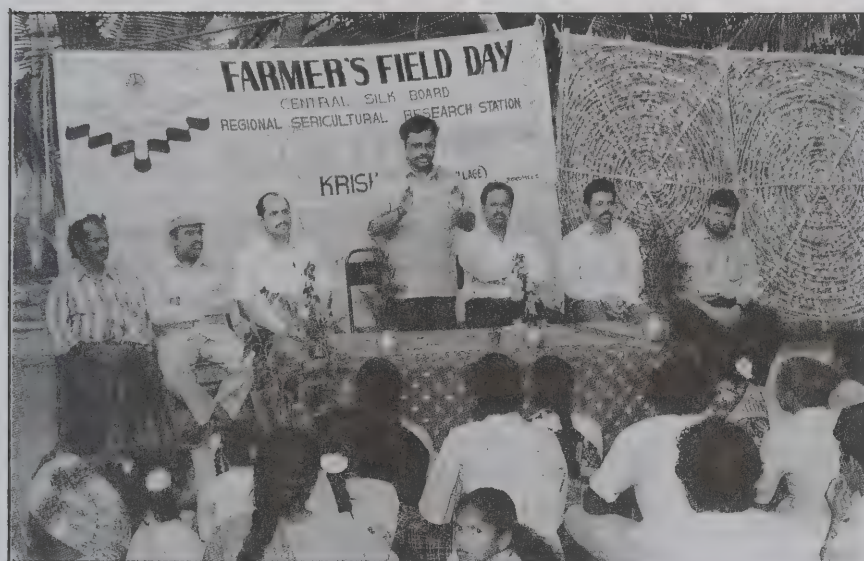
Exporters interested in applying may write to Indian Silk Export Promotion Council, 62, Mittal Chambers, Nariman Point, Mumbai-400 021 or to the Commission for application form.

*(Source: Silknet)*

**Please make your letters brief and to the point. Send your letters to the Editor.**



## Field Day on New Technology



*Field day plays a vital role in the dissemination of technology*

A Field Day was organised by Research Extension Centre, CSR&TI, Krishnagiri, Tamil Nadu at Puliarisi village on January 2, 1998.

The field day was conducted as a part of the commemoration of 50th year of Independence, with

the objective to popularise improved CSR hybrid rearings among farmers of Krishnagiri area. It also coincided with crop harvest of a progressive farmer, Shri G. Venkatesh. An exhibition was also arranged on new sericultural

technologies.

Shri Hiriyantha, SRO, REC, Krishnagiri urged the farmers to adopt the new technologies. Shri Ramamoorthy, Asst. Director, DOS, Govt. of Tamil Nadu, Krishnagiri, informed the farmers about the advantages of sericulture over other major crops. Dr. J. Kodandaramaiah, Asst. Director, P<sub>2</sub>, BSF, Krishnagiri enlightened the farmers about the superior characters of S<sub>36</sub>, S<sub>13</sub>, S<sub>34</sub>, and V<sub>1</sub> mulberry varieties for more quality leaf yield and also advantages of taking up bivoltine rearing seasonal suitability, higher price, high quality and grade of bivoltine cocoons.

The participants were happy to hear from the progressive farmer himself that he got very good returns from the CSR hybrid rearing. Also staff from DOS, Krishnagiri, P<sub>2</sub> BSF and REC, Krishnagiri, attended the programme.

**Report : Hiriyantha, REC, Krishnagiri, Tamil Nadu.**

## Pinca '97 at Palakkad



*Shri Sivadasa Menon, Hon'ble Minister evincing interest in the improved charkha*

PINCA '97 (Palakkad Industrial Carnival) was organised by District Industries Centre, Palakkad, and Kerala State Small

Industries Association, Palakkad from 19 to 27 December '97 at Palakkad, Kerala. A pavilion by Central Silk Board, has exhibited

sericulture activities and the post-cocoon technologies.

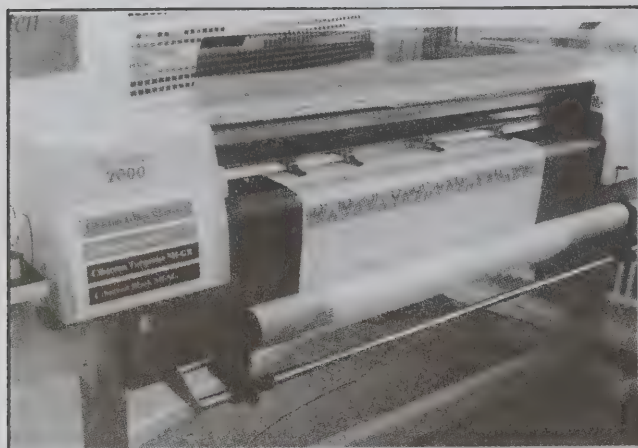
Shri Sivadasa Menon, Hon'ble Minister of Finance, Govt. of Kerala, Shri R.C. Kishore, IAS, District Collector, Shri Joshi, IPS, SP. Palakkad, Smt. (Dr.) Usha Titus, IAS, GM, DIC, Palakkad and Shri Mukesh Kumar, IAS, Asst. Collector, Palakkad graced the carnival by their presence. The carnival has given exposure to public on the entrepreneurship potential in silk industry.

CSB bagged a trophy in the carnival which was received by Shri Z.M.S. Khan, Asst. Director, DCTC, Palakkad. As a follow-up, a reelers and weavers meet was also organised in Palakkad during the 2nd week of March '98.

**Report : P.M. Damodhar Rao, CSTRI, Bangalore.**



## Ink-jet printing on silk fabrics



**The Innotech TexPrint 2000 piezo ink-jet printing machine uses the "drop-on-demand" process and gives a resolution of 360 drops per inch (DPI)**

A new, fully-integrated ink-jet textile printing system, which can also be used to print silk fabrics, was presented during January's Heimtextil home furnishing trade fair in Frankfurt, Germany. Ciba's Textiles Dyes division, based in Basel, Switzerland, presented the concept, which is said to be flexible, fast and cost-effective.

The system has been developed jointly with software manufactures Sophis, and with printing equipment supplied by Innotech. Ciba's Textile Dyes division have formulated special inks for various fibres, including acid inks for silk.

The software is used for design, colouration,

colour separation and calibration and control of the printer. Any design can be scanned in and adapted by the software as required, say Ciba. Equipment does not have to be cleaned between runs and there is no recipe formulation involved.

With the new system, response times are said to be very short, and there is no adjustment of equipment between runs. The Innotech TexPrint 2000 piezo ink-jet printing machine uses the "drop-on-demand" process, and the colours mix on the fibre. Ciba Speciality Chemicals' Textile Dyes division claim that all requirements can be covered with just four inks.

A special advantage emphasised by the company is the cost-effectiveness of short runs, allowing customised and personalised goods to be produced at an acceptable price. The system is further said to have strong environmental benefits, as the inks are highly fast, and no thickener and, frequently, no urea are needed.

According to Dr. Mickael Mheidle, head of business development, of the Ciba's Textiles Dyes Division, two main types of ink-jet technology have been developed over the past 10 years: continuous ink-jet and drop-on-demand.

However, the slow development of this technology has been due to specific technological limitations of the head or nozzle, which has restricted the ink classes which could be used, he said. The new system, it is claimed, overcomes these problems.

*Courtesy: Wool Record.*

## Indian Business Centre at Uzbekistan

An Indian Business Centre (IBC) jointly promoted by Ministry of Commerce and Confederation of Indian Industry has started functioning in Uzbekistan under the supervision of the Embassy of India.

The IBC would provide the following facilities to all Indian businessmen and companies interested in doing business with Uzbekistan.

- Identifying potential importers in Uzbekistan on behalf of Indian companies;
- Helping visiting Indian businessmen in setting up of meetings with counterpart Uzbek firms.
- Providing communication and secretarial facilities to visiting Indian businessmen on payment basis;
- Booking of hotel and local transport etc., for visiting Indian businessmen;
- Providing information on Uzbek economy and trade opportunities in Uzbekistan;

- Helping Indian companies' participation in local and international tenders; and
- Identifying investment opportunities in Uzbekistan for potential India joint ventures.
- Follow-up of discussions of Indian businessmen with Uzbek organisations.

In addition, the Indian Business Centre would also have a display section where Indian companies can display their products and catalogues. Interested, may contact :

**Indian Business Centre,**  
59, Pushkin Street,  
Tashkent - 700 000, Uzbekistan  
Tel:007-3712-671457, 360008  
Fax: 007 - 3712 - 678942  
E-mail: mohan @ cii.silk.glas. apc.org

**(Source: Silknet)**



# The short flowering of the art of ikat

A New book, *Ikat: Silks of Central Asia* by Kate Fitz Gibbon and Andrew Hale, published by Laurence King Publishing in association with Alan Marcuson, explores the remarkable revival of the ikat-weaving tradition that took place during the 19th century in Central Asia. Ikat, a warp-faced fabric in which all the colours are applied to the silk warp yarns in a tie-dye resist method before the yarns are woven, results in textiles of dazzling colour and design. The fusion of many artistic traditions-ancient, urban and nomadic-resulted in astoundingly beautiful designs for ikat fabrics which were rapidly in demand both among local ethnic groups and in the export market.

Ikats were used primarily for opulent costumes and wall hangings for the local court and affluent households, and by the 1870s they were as prominent in the decor of nomad yurts as they were in the homes of Bukhar's elite. However, the flowering of the art of ikat lasted only a short time and by the late 19th century the introduction of synthetic dyes ended the production of these richly hued, hand-dyed silk weavings.

Fitz Gibbon and Hale's extensive documentation, based on 20



years of research and their study of the largest and most comprehensive collection of ikats anywhere in the world (the unparalleled collection of Dr. Guido Goldman), places ikat production in its historical and social context.

The authors analyse the evolution and chronology of these textiles, showing the cross-fertilisation of influences between ikat design, embroidery, carpets, jewellery and

ceramics. They describe the complex history of the region, defining the important ritual function of textiles in society and offering an absorbing insight into trading history.

*Ikat: Silks of Central Asia* examines the fascinating lives of the makers, their guilds, the beliefs and mystique surrounding their skills, and details the full process in the creation of ikats.

Each complete furnishing or garment has been especially photographed for this book by Don Tuttle, together with carefully-selected details. In addition, previously unpublished documentary photographs commissioned in the 1870s offer ground-breaking visual information on the lifestyle of these multi-ethnic Central Asian communities.

*Ikat: Silks of Central Asia*, by Kate Fitz Gibbon and Andrew Hale, 1997, is published by Laurence King Publishing in association with Alan Marcuson. Price £ 145, 500 illustrations, 424 in colour, 368 pages, 360 x 295 mm. Laurence King Publishing is an imprint of Calmann & King Ltd., 71 Great Russell Street, London WC1B 3 BN, UK.

**Courtesy: Wool Record (March, 98)**

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# Textile Trade Fairs – 1998

Date	Exhibition	Place
	<b>INDIA</b>	
1998 May 29-01	<b>ACC-MA-TEX-II</b> Garment Accessories, Machineries and Textiles (Hosiery and Textile Fabrics) Venue : Netaji Indoor Stadium Contact : Freeman Graphics & Designs Pvt. Ltd. Ph : 6607219/7441 Fax: 091-033-6607441/1803	Calcutta
	<b>OVERSEAS</b>	
1998 Apr 01-03	<b>INTERSTOFF ASIA</b> Fabrics, Fibres, Yarns, Accessories CAD/CAM Contact : Indo-German Chamber of Commerce, Mumbai Ph : 2186131 Fax : 91-22-2180523	Hong Kong China
06-08	<b>ACTIVE WEAR '98</b> High-performance Fabrics Contact : Gary McIlvenny Focal Event Management, SK223EX Ph : 746100 Fax: 44-1663-746920	Manchester U.K.
21-23	<b>INTERSTOFF</b> Ready-to-wear Manufacturers Venue : MesseGelande Contact : Indo German Chamber of Commerce, Mumbai Ph : 2186131 Fax: 091-022-2180523	Frankfurt Germany
22-25	<b>MOTEXHA SPRING '98</b> Fashion, Textiles, Accessories and Leather Products Venue : World Trade Centre Contact : IIR Exhibitions, P.O. Box 28943 Ph : 365161 Fax: 97-14-364006	Dubai U.A.E.

Date	Exhibition	Place
28-30	<b>INTERNATIONAL FASHION FABRIC EXHIBITION</b> Apparel Fabrics, Trimmings, Designing Systems. Spring Summer '99 – Immediate Venue : Javit Convention Centre Contact : The Larkin Group, New York NY 10018 Ph : 5940880 Fax: 1-212-5948556	New York U.S.A
May 30-02	<b>INTERNATIONAL FASHION BOUTIQUE</b> Womens Apparel, Accessories and Jewellery Immediate – Fall Venue : Javit Convention Centre Contact : The Larkin Group, New York NY 10018 Ph : 5940880 Fax: 1-212-5948556	New York U.S.A
July 15-18	<b>HONG KONG FASHION WEEK</b> Fabrics, Ready-to-wear, Accessories Venue : Hong Kong Convention and Exhibition Centre Contact : Hong Kong Trade Development Council, Wanchai Ph : 25844333 Fax: 852-28240249	Hong Kong China
15-18	<b>EUROPE SELECTION</b> Womens, Mens, Kidswear, Body-to-beach-wear Contact : Europe Selection S.r.l./ Hong Kong Ph : 28029902	Hong Kong
24-26	<b>HERREN MODE - WOCHE/INTER - JEANS</b> Casualwear and Young Fashionwear Contact : Indo-German Chamber of Commerce, Mumbai Ph : 2186131 Fax : 91-22-2180523	Cologne Germany



# Trade Enquiries

Sl. No.	Importers	Interested in
1.	Mr. Kamugu P.O. Box 2081, Nakuru, Nairobi Tel : (037) 44253	Mulberry Seeds Spinning & Weaving machine for silk
2.	G. Otanga Kenya Airways Ltd P.O. Box 19002, Nairobi Tel : 229291 Fax : 823488	Garment accessories (Surat based)
3.	Hvalsoe A/S 5, Irlandsvej, DK-2300 Copenhagen S, Denmark Tel : (+45) 32 84 84 49 Fax : (+45) 43 84 84 96	High-Class Casual & Fashion Ladies Dresses of Cotton, Viscose or Silk
4.	KJM Design Consult 16, Victoriagade, 3rd Floor DK-1655 Copenhagen V Denmark Tel : (+45) 33 79 74 70 Fax : (+45) 33 93 74 02	Gents' & Ladies' Ready-Made Garments, Knitwear, Fabrics, Printed/Embroidered/ Transparent
5.	Blue Aqua 109, Georgsgade DK-5000 Odense C, Denmark Tel : (+45) 66 14 47 50 Fax : Identical	Children's Ready-Made Garments (Age Group : 3-12 Years)
6.	Gading Permal SDN. BHD. 25, Mezzanine Floor Jalan Thambi Abdullah Satu Jalan Tun Sambanthan 50470 Kuala Lumpur	Saree Manufacturers
7.	Gulen Hafi Trading SDN BHD 28C, Lorong Bunus 6 Off Jalan Tuanku Abdul Rahman 50100 Kuala Lumpur	Scarves
8.	Bisnestek (M) SDN BHD No. 15-1, Jalan Kenanga SD 9/4 Bandar Sri Damansara 52200 Kuala Lumpur, Malaysia	Fabrics, Ready Made Garments
9.	Philippe Ligot Rue des Carmes 15, 4600 Vise, Luxembourg, Belgium Tel : 04-3790504 Fax : 04-3798397	Carpets/Textiles
10.	M/s. Monarak De Diamont Abdul Rahman Khalifa Street 7th Circle, Amman Tel : 00-962-6-828008 Fax : 00-962-6-811473	Yarns, Fabrics and Fibres

# उत्तर भारत में ओक तसर की सम्भावनाएँ

सत्यभान सारस्वत

**हि**मालय में रेशम उद्योग के विकास के क्रम में “जंगली रेशम” की एक नई प्रजाति का विकास किया गया है। भारत में जंगली रेशम को आधुनिक रूप में लाने का सर्वप्रथम प्रयास वर्ष 1967 में किया गया। जम्मू-कश्मीर के रामवन तहसील में रामसू के पास चक्का गाँव की पहाड़ी पर बाँज के जंगलों में प्राप्त बड़े कोसे तथा दो कवचयुक्त प्रजाति एन्थीरिया और मूलतः चीन की प्रजाति एन्थीरिया पर्नी से एक नये वर्ण संकर एन्थीरिया प्रोपली को विकसित किया गया जो रेशम अनुसन्धान के क्षेत्र में बड़ी उपलब्धि थी।

**ओक तसर कीटपालन को वैसे तो भारत के उत्तर-पूर्वी राज्यों में अधिक महत्वपूर्ण स्थान प्राप्त है किन्तु उत्तर भारत के हिमाचल, जम्मू व कश्मीर तथा उत्तर प्रदेश में इसकी संभावनाएँ कुछ कम नहीं। क्षेत्र में विशिष्ट अनुकूलता के कारण इसकी संभावनाओं से लाभ उठाने की आवश्यकता है।**

## भोज्य पौधों की प्रचुरता

उत्तर प्रदेश के कुमाऊँ से कश्मीर के लद्दाख क्षेत्र तक फैली पहाड़ियों पर करोड़ों की संख्या में पौधे, झाड़ियों तथा वृक्ष के रूप में बाँज (ओक) के पेड़ पाये जाते हैं। उपलब्ध आकड़ों से ज्ञात हुआ है कि उत्तर प्रदेश के पहाड़ी क्षेत्र में, कुमाऊँ एवं गढ़वाल में लगभग 3 लाख हेक्टेयर में बाँज व मोरू के पौधे हैं।

इसी प्रकार हिमाचल, जम्मू व कश्मीर के पहाड़ी क्षेत्रों में भी लगभग 1-2 लाख हेक्टेयर में ओक के पौधे पाये जाते हैं जिनमें सर्वाधिक पौधे बाँज (क्वेरकस इन्काना) तथा क्रमानुसार अन्य पौधे मोरू (क्वेरकस हिमालयाना व क्वेरकस डेलबाटा) के हैं। क्वेरकस सेमीकार्पिफोलिया, क्वेरकस सिरेटा, क्वेरकस आइलेक्स, क्वेरकस ग्लाई की भी ओक प्रजातियाँ कहीं-कहीं पाई जाती हैं।

## अनुकूल जलवायु

उत्तर भारत में ओक तसर की सम्भावनाओं के लिए उचित जलवायु एवं प्राकृतिक सुविधाएँ उपलब्ध हैं। यहाँ 1000-3000 मीटर (समुद्र तल से ऊँचाई) तक तो कहीं-कहीं 500-700 मीटर की घाटी में भी ओक पौधे पाये जाते हैं। 1000-3000 मीटर तक की ऊँचाई पर उपलब्ध, ओक पौधों को कीटपालन के उपयोग में लाया जाता है। उत्तर भारत में वर्ष के 9 माहों में ओक तसर कीटपालन किया जा सकता है जब औसत तापक्रम व आर्द्रता निम्न प्रकार रहती हैं :

ओक तसर कीटपालन घरों में व बाहर पेड़ों पर भी किया जाता है जिसके लिए न्यूनतम तापक्रम 20° से. तथा अधिकतम 32° से. होता है। उपयुक्त तापक्रम 25°-27° से. ही है किन्तु विभिन्न माहों में तापक्रम को मानवीय प्रभाव से नियंत्रित किया जा सकता है। इस प्रकार, वर्ष में दो बार ओक तसर कीटपालन किया जाता है। इस क्षेत्र की एक और विशेषता है कि 1-2 किमी. के क्षेत्र में 700-1500 मी. की ऊँचाई पर ओक पौधे उपलब्ध होने के कारण उसी क्षेत्र में विभिन्न अवस्थाओं के रेशमकीटों के लिए वांछित प्रकार के पत्ते उपलब्ध हो जाते हैं।

## अनुसन्धान उपलब्धियाँ

विगत लगभग 30 वर्षों से उत्तरी भारत के हिमालय क्षेत्र में विभिन्न राज्यों में केन्द्रीय रेशम बोर्ड द्वारा क्षेत्रीय अनुसंधान

माह	तापक्रम (से)		आर्द्रता प्रतिशत
	अधिकतम	न्यूनतम	
मार्च	20	05	70
अप्रैल	22	12	70
मई	30	20	60
जून	32	22	55
जुलाई	35	22	65
अगस्त	30	20	80
सितम्बर	29	21	80
अक्टूबर	20	10	80
नवम्बर	15	08	75



केन्द्र व प्रसार केन्द्रों की स्थापना के साथ ओक तसर में अनुसन्धान कार्य क्षेत्रीय स्तर पर किए जा रहे हैं। ओक तसर के विभिन्न पहलुओं में प्राप्त कुछ उपलब्धियाँ निम्नलिखित हैं:

1. वसंत की फसल (मार्च-अप्रैल) में अन्तः कीटपालन में आशातीत सफलता मिली तथा कश्मीर के बटोट जैसे हिमपात वाले पहाड़ी क्षेत्रों में 80 प्रतिशत तक कोसा उत्पादन हुआ।
2. रेशमकीटों को भोज्य पौधों पर अन्तरित करने से कोसा उत्पादन में गुणात्मक सफलता मिली।
3. प्रकाश-प्रभावीकरण से अपेक्षित समय पर प्रस्फुटन प्रारम्भ हुआ।
4. ऊँचाई कोसों के संरक्षण से उनमें जीवित कोष की प्रतिशतता अधिक रहती है।

ऐसे व्यावहारिक प्रयोगों से ओक तसर ने धीरे-धीरे उत्तर भारत में अपना आधार सुदृढ़ किया तथा प्रयोगशाला से प्रक्षेत्र तक के सफल प्रभावकारी परीक्षण संचालित किये गये।

## समस्याएं

शहतूती रेशम की तुलना में ओक तसर उद्योग को प्रारम्भ करना सरल है क्योंकि इसमें प्रकृति में उपलब्ध भोज्य पौधों का उपयोग होता है जबकि शहतूत रोपण एवं उसके रखरखाव में उत्पादन लागत का 40-60 प्रतिशत तक व्यय हो जाता है। किन्तु, भारत में समुचित जलवायु एवं प्राकृतिक सम्पदा के रूप में ओक तसर में गुणात्मक विकास की अधिक सम्भावनाओं के बावजूद चीन के समान ओक तसर उद्योग का विकास नहीं हो सका जिसके मूल कारण संभवतः निम्नलिखित हैं :

1. ओक पौधे एवं संसाधनों के प्रचुर मात्रा में उपलब्ध होने पर भी ओक तसर उत्पादन हेतु एकीकृत प्रयास उत्तर भारत में नहीं किए गए।
2. अनुसन्धानों के आधार में मूलभूत आवश्यकताओं का अभाव।
- अ. ओक बीज कोसों का संरक्षण तथा बीजोत्पादन में त्रुटि।
- ब. एकरूपता लाने के उद्देश्य से ओक तसर में वंशानुगत गुणों का अध्ययन नहीं हुआ।
- स. उत्पादन के दृष्टिकोण से भोज्य पौधे की सर्वश्रेष्ठता नहीं निर्धारित की गई।
3. प्रयोगशाला परिणामों के विस्तरण में सम्बन्धित राज्य सरकारों ने कोई विशेष रुचि नहीं दिखाई।
4. प्रचार-प्रसार के समुचित प्रबन्ध का अभाव।

**तालिका : उत्तर भारत में ओक वृक्षों की उपलब्धता**

राज्य	प्रजाति	क्षेत्रफल (हेक्टेयर)
जम्मू व कश्मीर	क्वेरकस इन्काना, हिमालयाना, सेमीकार्पिफोलिया, ग्लाई, आइलैक्स	55000
हिमाचल प्रदेश	क्वेरकस इन्काना, डेलबाटा, सेमीकार्पिफोलिया	139000
उत्तर प्रदेश	क्वेरकस इन्काना, सेमीकार्पिफोलिया, ग्लाई, आइलैक्स, हिमालयाना	305000

## सम्भावनाएं

उत्तर भारत के तीन राज्य उत्तर प्रदेश, हिमाचल प्रदेश एवं जम्मू व कश्मीर में ओक तसर भोज्य पौधे प्रचुरता में उपलब्ध हैं। साथ ही, इस उद्योग में विकास की अनेक संभावनाएं निहित हैं।

**रोजगार के साधन :** उत्तर प्रदेश के उत्तराखण्ड, हिमाचल के कांगड़ा, जम्मू व कश्मीर के डोडा आदि क्षेत्रों के निवासी रोजगार की तलाश में पलायन कर रहे हैं। ओक तसर उद्योग की स्थापना इसी क्षेत्र में हो जाने पर यह पलायन रूक सकता है।  
**आवागमन के सुलभ साधन :** उत्तर भारत के ये तीनों राज्य रेल व सड़क से जुड़े हैं, इससे कच्चे माल व उत्पाद का क्रय-विक्रय सरलता से हो सकेगा।

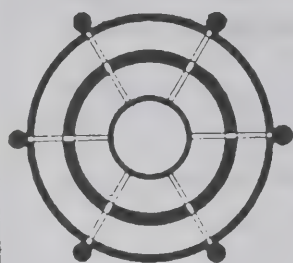
**बीज कोसों का संरक्षण :** उत्तर भारत में ऊँचे स्थानों पर बीज कोसों का संरक्षण करने के साधन हैं जिसके कारण पूर्व में किए गये संरक्षण के प्रयोगों की पुनरावृत्ति करने से उन बीजोत्पादन की समस्याओं का समाधान हो सकता है।

## कच्चे माल की आवश्यकता

ओक तसर कोसों की आवश्यकता साड़ी, कपड़े व शाल बनाने में होती है। कुर्ता तथा अच्छी शाल के साथ-साथ कालीन बनाने में भी इसका प्रयोग होता है जिसका बहुत बड़ा बाजार उत्तर भारत में है।

इस प्रकार, यह विचार किया जा सकता है कि यदि उत्तर भारत में ओक तसर की पुनः स्थापना के लिए प्रयत्न किए जाएं तो शायद न केवल सफलता ही मिलेगी अपितु हजारों व्यक्तियों को रोजगार मिलेगा व पहाड़ों से पलायन भी बन्द हो सकता है।

**लेखक पूर्वांचल रेशम विकास परियोजना, वाराणसी में कार्यरत हैं।**



# Exports Review

Foreign exchange earnings of the Indian silk industry during the month of January '98 amounted to Rs. 8368.73 lakh compared to Rs. 7955.42 lakh during January '97.

During April '97 to January

## Review of Silkgoods Certified for Exports

During January 1998 and April '97 to January '98 period of the year 1997-98

TABLE - I

### Export Performance of Indian Silk Industry

(Unit : Lakh ; Qty : Silkgoods ; Sq. Mtrs. ; Silkyarn/Silkwaste : Kg ; Value : Rs.)

Item of Export	January				% Increase		April to January				% Increase	
	1998		1997				1997-98		1996-97			
	Qty.	Value	Qty.	Value	Qty.	Value	Qty	Value	Qty.	Value	Qty.	Value
A. Silkgoods :												
(1) Mulberry												
(i) Dress Material	16.02	3397.14	19.45	3327.20	-17.6	2.1	160.12	28879.40	168.99	27779.28	-5.2	4.0
(ii) Readymade Garments	3.22	1294.49	6.18	1544.88	-47.9	-16.2	43.86	13522.38	82.87	18063.03	-47.1	-25.1
(iii) Carpets	0.07	878.51	0.06	784.31	16.7	12.0	1.22	9635.72	0.83	7204.12	47.0	33.8
(iv) Sarees	2.05	517.20	2.69	522.89	-23.8	-1.1	25.12	5379.19	28.79	5417.07	-12.7	-0.7
(v) Scarves/stoles	6.78	916.28	9.08	930.38	-25.3	-1.5	50.85	5587.03	67.54	6536.36	-24.7	-14.5
(vi) Others	3.14	752.86	2.69	401.66	16.7	87.4	24.28	5256.13	26.71	4460.96	-9.1	17.8
Mulberry Total [i to vi]	31.28	7756.48	40.15	7511.32	-22.1	3.3	305.45	68259.85	375.73	69460.82	-18.7	-1.7
(2) Tasar	1.03	159.13	1.28	158.41	-19.5	0.5	8.38	1308.96	8.81	1499.85	-4.9	-12.7
Total [1+2]@	32.31	7915.61	41.43	7669.73	-22.0	3.2	313.83	69568.81	384.54	70960.67	-18.4	-2.0
(3) Mixed/Blended	2.08	203.76	2.12	224.24	-1.9	-9.1	20.41	2737.33	17.73	1867.92	15.1	46.5
Total [1+2+3]	34.39	8119.37	43.55	7893.97	-21.0	2.9	334.24	72306.14	402.27	72828.59	-16.9	-0.7
B. SILKYARN	0.06	17.29	-	-			0.25	93.24	0.04	43.42	525.0	114.7
C. SILKWASTE	1.19	232.07	0.44	61.45			6.88	1260.33	0.52	72.84		
TOTAL [A+B+C]		8368.73		7955.42		5.2		73659.71		72944.85		1.0

@ Refers to total natural silk goods exports

'98 period of the year 1997-98, foreign exchange earnings from silkgoods certified for exports amounted to Rs. 73659.71 lakh as against Rs. 72944.85 lakh during the corresponding period of previous year.

Data on itemwise silkgoods certified for exports by Central Silk Board are given in Table-I.

Comparative data on region-wise silkgoods certified for exports are given in Table-II.

### Natural silkgoods

During January '98, the natural silkgoods certified for exports amounted to 32.31 lakh sq. mtrs. valued at Rs. 7915.61 lakh as against 41.43 lakh sq. mtrs. valued

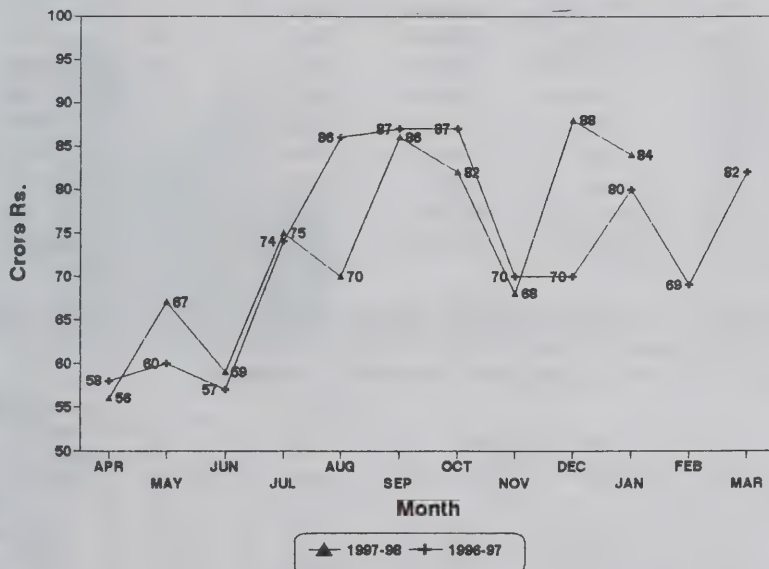


**Table - II**  
**Regionwise Silkgoods certified for exports**

[Unit:Lakh;Qty: Sq.mtrs;Value:Rs.]

Region	January						April to January					
	1998		1997		% Increase		1997-98		1996-97		% Increase	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
West Europe	17.05	4061.91	21.23	3531.67	-19.7	15.0	138.84	31077.41	161.35	29451.33	-14.0	5.5
U.S.A. & Others	9.37	2616.03	13.37	2866.21	-29.9	-8.7	111.98	26546.61	148.64	29057.81	-24.7	-8.6
Asia	6.97	1082.57	7.34	1142.29	-5.0	-5.2	65.07	10658.27	68.25	10055.40	-4.7	6.0
Japan & Others	0.64	204.69	0.72	214.93	-11.1	-4.8	6.39	1771.78	8.35	2006.88	-23.5	-11.7
Africa	0.26	134.60	0.61	113.47	-57.4	18.6	5.78	1675.88	6.00	1224.31	-3.7	36.9
East Europe	0.10	19.57	0.28	25.40	-64.3	-23.0	6.18	576.19	9.68	1032.86	-36.2	-44.2
Total	34.39	8119.37	43.55	7893.97	-21.0	2.9	334.24	72306.14	402.27	72828.59	-16.9	-0.7

### Certified Silk Export Earnings



at Rs. 7669.73 lakh during the corresponding month of previous year.

During April '97 to January '98 period of the year 1997-98, the aggregate natural silkgoods certified for exports amounted to 313.83 lakh sq. mtrs. valued at Rs. 69568.81 lakh as against 384.54 lakh sq. mtrs. valued at Rs. 70960.67 lakh during the corresponding period of preceding year and showed a decrease of 18.4% in quantity and 2% in value.

### Mulberry silkgoods

During January '98, mulberry silkgoods certified for exports

**Table - III**  
**Centrewise/Varietywise Silkgoods/Silkyarn/Silkwaste certified for exports during April '97 to January '98 period of the year 1997-98**

[Unit:Lakh;Qty:Silkgoods:Sq.mtrs;Silkyarn/Silkwaste:Kg;Value:Rs.]

Centre	Mulberry		Tasar		Mixed Blended		Sub-Total		% Share		Silkyarn		Silkwaste		Grand Total Value	% Share of Centre
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value		
Mumbai	35.12	8046.28	1.92	411.35	3.06	647.24	40.10	9104.86	12.0	12.6	0.10	24.29	0.00	0.00	9129.16	12.4
Bangalore	110.49	20095.92	0.53	80.61	6.08	297.38	117.10	20473.90	35.0	28.3	0.03	33.37	0.00	0.00	20507.27	27.8
Bhagalpur	10.33	1442.45	0.97	172.78	2.42	237.98	13.72	1853.21	4.1	2.6	0.00	0.00	0.00	0.00	1853.21	2.5
Chennai	9.57	2567.85	0.13	27.69	1.30	181.94	11.00	2777.47	3.3	3.8	0.00	0.00	6.77	1237.96	4015.43	5.5
Calcutta	40.78	7147.99	3.02	381.96	1.30	70.97	45.10	7600.92	13.5	10.5	0.12	35.58	0.11	22.37	7658.88	10.4
New Delhi	88.83	27432.82	1.51	178.62	0.45	70.34	90.78	27681.78	27.2	38.3	0.00	0.00	0.00	0.00	27681.78	37.6
Varanasi	5.20	700.19	0.31	55.96	5.82	1231.48	11.33	1987.64	3.4	2.7	0.00	0.00	0.00	0.00	1987.64	2.7
Srinagar	4.46	718.90	0.00	0.00	0.00	0.00	4.46	718.90	1.3	1.0	0.00	0.00	0.00	0.00	718.90	1.0
Hyderabad	0.66	107.46	0.00	0.00	0.00	0.00	0.66	107.46	0.2	0.1	0.00	0.00	0.00	0.00	107.46	0.1
Total	305.45	68259.85	8.38	1308.96	20.41	2737.33	334.24	72306.14	100.0	100.0	0.25	93.24	6.88	1260.33	73659.71	100.0

**Table - IV**  
**Foreign Exchange Earnings from Mulberry Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	January		%	April to January		%	Country Share Percentage in	
	1998	1997		1997-98	1996-97		1997-98	1996-97
U.S.A.	2284.62	2675.94	-14.6	22898.67	25383.28	-9.8	33.5	36.5
Germany	1040.30	1073.07	-3.1	10428.34	10072.13	3.5	15.3	14.5
U.K.	963.88	725.66	32.8	6858.41	7038.95	-2.6	10.0	10.1
France	540.39	365.42	47.9	3510.60	2584.66	35.8	5.1	3.7
Italy	590.51	285.26	107.0	2852.07	1970.63	44.7	4.2	2.8
U.A.E.	263.18	203.13	29.6	2164.32	1960.88	10.4	3.2	2.8
Canada	199.47	126.63	57.5	2013.43	2136.15	-5.7	2.9	3.1
Hong Kong	248.92	221.10	12.6	1848.81	1823.74	1.4	2.7	2.6
Singapore	128.63	191.13	-32.7	1658.44	1804.29	-8.1	2.4	2.6
Netherlands	185.41	205.32	-9.7	1316.27	1522.48	-13.5	1.9	2.2
Denmark	60.29	97.57	-38.2	862.64	619.39	39.3	1.3	0.9
Australia	104.27	98.41	6.0	834.36	1019.61	-18.2	1.2	1.5
Switzerland	78.05	104.04	-25.0	786.02	847.23	-7.2	1.2	1.2
Spain	186.99	128.59	45.4	751.01	796.38	-5.7	1.1	1.1
Mauritius	60.05	7.70	679.9	647.22	361.89	78.8	0.9	0.5
Thailand	-	0.73	-	625.68	244.74	155.7	0.9	0.4
Japan	69.06	85.50	-19.2	583.56	646.43	-9.7	0.9	0.9
Belgium	69.97	85.59	-18.2	493.37	625.33	-21.1	0.7	0.9
Malaysia	27.39	32.16	-14.8	487.61	448.27	8.8	0.7	0.6
Austria	23.35	42.10	-44.5	443.77	681.44	-34.9	0.7	1.0
Others	631.75	756.27	-16.5	6195.25	6872.92	-9.9	9.1	9.9
Total	7756.48	7511.32	3.3	68259.85	69460.82	-1.7	100.0	100.0

@ Refers to top 20 importing countries

**Table - V**  
**Foreign Exchange Earnings from Tasar Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	January		%	April to January		%	Country Share Percentage in	
	1998	1997		1997-98	1996-97		1997-98	1996-97
Germany	22.72	53.90	-57.8	233.10	321.96	-27.6	17.8	21.5
U.S.A.	22.32	20.47	9.0	205.06	284.36	-27.9	15.7	19.0
France	19.60	13.62	43.9	147.67	64.06	130.5	11.3	4.3
Hong Kong	14.27	2.14	566.8	118.74	14.45	721.7	9.1	1.0
U.A.E.	15.76	21.95	-28.2	111.22	152.18	-26.9	8.5	10.1
Japan	6.48	5.43	19.3	84.75	134.62	-37.0	6.5	9.0
Italy	5.57	3.82	45.8	56.69	59.73	-5.1	4.3	4.0
U.K.	6.96	14.14	-50.8	42.97	104.09	-58.7	3.3	6.9
Brazil	5.65	0.34	1561.8	42.23	23.63	78.7	3.2	1.6
Spain	3.90	1.79	117.9	37.60	16.62	126.2	2.9	1.1
Kuwait	9.19	1.79	413.4	23.95	27.42	-12.7	1.8	1.8
Belgium	6.87	0.14	4807.1	20.75	3.94	426.6	1.6	0.3
Turkey	2.80	-	-	19.30	10.10	91.1	1.5	0.7
Canada	0.52	2.92	-82.2	15.44	30.86	-50.0	1.2	2.1
Saudi Arabia	-	0.65	-100.0	14.71	12.88	14.2	1.1	0.9
Argentina	2.75	-	-	14.61	2.14	582.7	1.1	0.1
South Africa	-	-	-	14.38	10.97	31.3	1.1	0.7
Afghanistan	1.77	4.20	-57.9	11.79	10.79	9.3	0.9	0.7
Colombia	-	-	-	9.60	-	-	0.7	0.0
Switzerland	1.81	1.66	9.0	7.96	12.68	-37.2	0.6	0.8
Others	10.19	9.45	7.8	76.44	202.37	-62.2	5.8	13.5
Total	159.13	158.41	0.5	1308.96	1499.85	-12.7	100.0	100.0

@ Refers to top 20 importing countries

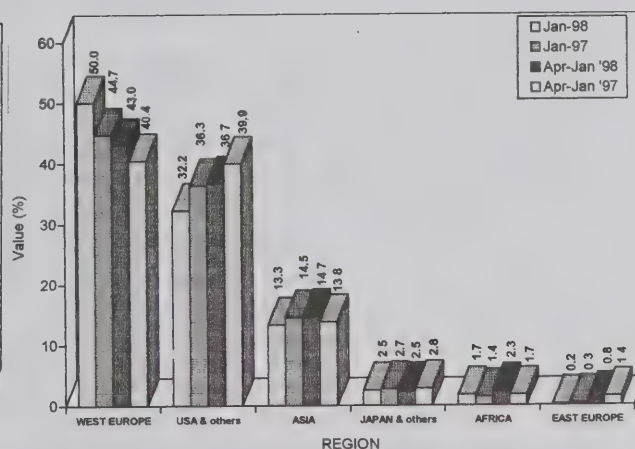
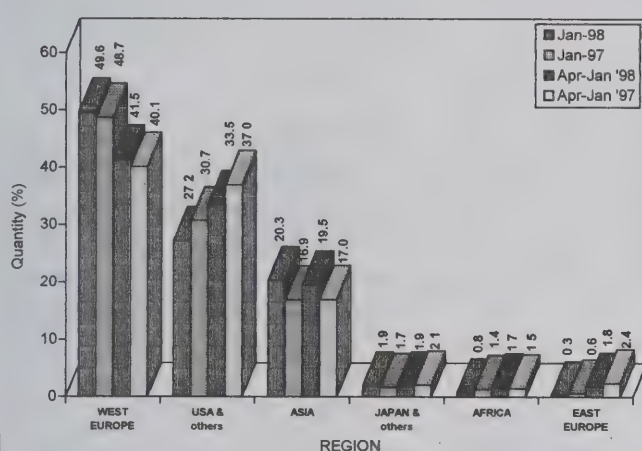


**Table - VI**  
**Unit Export Price**

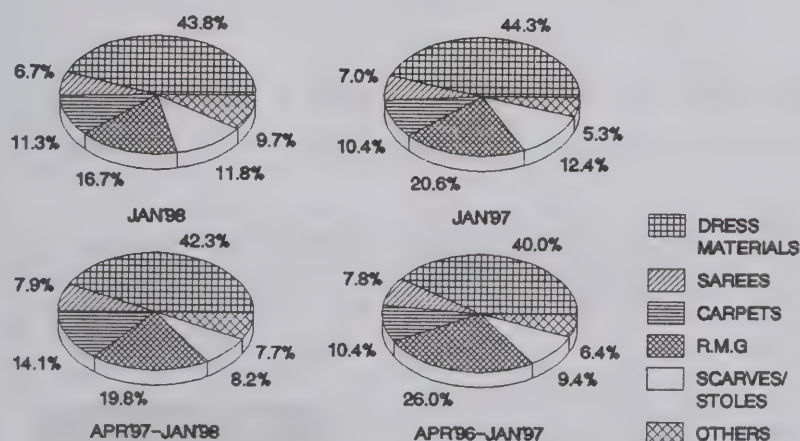
(Rs. per Sq.mtr.)

Item	January			April-January		
	1998	1997	% increase	1997-98	1996-97	% Increase
<b>A. Mulberry Silkgoods</b>						
1. Excl. Carpets	220.39	167.80	31.3	192.70	166.06	16.0
2. Incl. Carpets	247.96	187.08	32.5	223.47	184.87	20.9
3. Carpets	12022.87	12876.50	-6.6	7875.02	8647.68	-8.9
<b>B. Tasar Silkgoods</b>	154.28	123.75	24.7	156.23	170.27	-8.2

### REGION-WISE SILKGOODS CERTIFIED FOR EXPORTS



### Share percentage of Varietywise Mulberry Silkgoods Export Earnings



amounted to 31.28 lakh sq.mtrs. valued at Rs. 7756.48 lakh as against 40.15 lakh sq. mtrs. valued at Rs. 7511.32 lakh during January '97.

During April '97 to January '98 period of the year 1997-98, mulberry silkgoods certified for exports amounted to 305.45 lakh sq. mtrs. valued at Rs. 68259.85 lakh compared with 375.73 lakh sq. mtrs. valued at Rs. 69460.82 lakh during the corresponding period of 1996-97. It showed a decrease of 18.7% in quantity and 1.7% in value. Out of the total natural silkgoods certified for exports, the share of mulberry silkgoods roughly amounted to 97% in quantity and 98% in value.

Countrywise data of mulberry silkgoods certified for exports is given in Table-IV.

#### **Varietywise mulberry silkgoods**

During April '97 to January '98 period of the year 1997-98, among the various varieties of mulberry silkgoods certified for exports, dress materials ranked first followed by readymade garments, carpets, sarees and scarves/stoles. Data of varietywise mulberry silkgoods certified for exports are given in Table-I.

#### **Tasar silkgoods**

During January '98, tasar silkgoods certified for exports amounted to 1.03 lakh sq.mtrs. valued at Rs. 159.13 lakh compared with 1.28 lakh sq.mtrs. valued at Rs. 158.41 lakh during January '97.

During April '97 to January '98 period of the year 1997-98, a total quantity of 8.38 lakh sq. mtrs. of tasar silkgoods valued at

Rs. 1308.96 lakh were certified for exports as against 8.81 lakh sq. mtrs. valued at Rs. 1499.85 lakh during the corresponding period of previous year.

Countrywise data of tasar silkgoods certified for exports are given in Table-V.

#### **Unit export price**

The unit export price realised for mulberry and tasar silkgoods during January '98 and April '97 to January '98 period of the year 1997-98 along with comparative data of previous year are given in Table-VI.

#### **Mixed or blended silkgoods**

During January '98, mixed/blended silkgoods certified for exports amounted to 2.08 lakh sq.mtrs. valued at Rs. 203.76 lakh compared with 2.12 lakh sq. mtrs. valued at Rs. 224.24 lakh during January '97.

Mixed/blended silkgoods certified for exports during April '97 to January '98 period of the

year 1997-98 amounted to 20.41 lakh sq. mtrs. valued at Rs. 2737.33 lakh compared with 17.73 lakh sq. mtrs. valued at Rs. 1867.92 lakh in the corresponding period of previous year and reflected an increase of 15.1% in quantity and 46.5% in value.

#### **Silkyarn**

About 25 tons of spun and noil silk yarn valued at Rs. 93.24 lakh has been certified for exports during April '97 to January '98 period of the year 1997-98 as against 4 tons valued at Rs. 43.42 lakh in the corresponding period of 1996-97.

#### **Silkwaste**

Silkwaste and its bye-products certified for exports during April '97 to January '98 period of the year 1997-98 amounted to 688 tons valued at Rs. 1260.33 lakh as against 52 tons valued at Rs. 72.84 lakh in the corresponding period of previous year.

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# Silk Prices

January 1998

## Raw Silk : Volume of Transaction

At all the silk exchanges in Karnataka, a total quantity of 115.626 tons of all qualities of raw silk valued at Rs.1262.361 lakh was transacted during the month of January '98 as against a quantity of 124.693 ton valued

Exchange alone accounted for 80% and 75.3% in both quantity and value, respectively.

During the first ten months of the year 1997-98 (i.e., April '97 to January '98) at Bangalore Silk Exchange, a total quantity of 1117.861 ton of all qualities of raw silk valued at Rs. 11008.166 lakh was transacted. The volume of trade at

Bangalore Silk Exchange during the period April '97 to January '98 accounted for 79.7% in quantity and 75.9% in value of the total transaction in all silk exchanges of the State.

Data on qualitywise transaction of raw silk at Bangalore Silk Exchange *vis-a-vis* at all the silk exchanges in Karnataka during January '98, January '97, April '97

**Table I. Transaction of Raw Silk at Bangalore Silk Exchange**

Raw Silk Quality	(Qty. : Ton, Value : Lakh Rs.)							
	January '98		January '97		April '97-January '98		April '96-January '97	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Filature/ Cottage Basin	19.311 (36.857)+	268.503 (510.739)	21.048 (34.346)	297.017 (483.224)	210.596 (398.244)	2757.780 (5213.187)	215.596 (382.860)	2874.360 (5073.960)
Charka	47.732 (53.116)	534.229 (602.935)	57.916 (70.813)	704.449 (866.644)	662.171 (750.330)	6890.497 (7874.136)	648.298 (762.518)	7210.355 (8531.352)
Dupion	25.493 (25.653)	147.552 (148.687)	19.486 (19.534)	129.976 (130.252)	245.094 (253.532)	1359.889 (1421.359)	225.919 (227.245)	1353.979 (1362.430)
Total	92.536 (115.626)	950.284 (1262.361)	98.450 (124.693)	1131.442 (1480.120)	1117.861 (1402.106)	11008.166 (14508.682)	1089.813 (1372.623)	11438.694 (14967.742)

+ Figures in bracket refer to total transaction at all the Silk Exchanges in Karnataka

at Rs. 1480.120 lakh during January '97. During the first ten months of the year of 1997-98 (i.e., April '97 to January '98), at all silk exchanges in Karnataka, a total quantity of 1402.106 ton valued at Rs. 14508.682 lakh was transacted as against 1372.623 ton valued at Rs. 14967.742 lakh of the preceding year.

## Bangalore Silk Exchange

At Bangalore Silk Exchange alone, which is the largest exchange in Karnataka, a total quantity of 92.536 ton of all qualities of raw silk *viz.*, filature/cottage basin, charka and dupion, valued at Rs. 950.284 lakh was transacted during January '98 as compared to 98.450 ton valued at Rs. 1131.442 lakh during January '97. Of the above transaction in Karnataka State, the volume of transaction at Bangalore Silk

**Table II. Transaction of Filature raw silk of different deniers at Bangalore Silk Exchange during January '98**

Denier	Quality	Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
				Min.	Max.	Avg.
13/15	Fine	1055	1543038	1400	1550	1463
14/16	Fine	1367	1932035	1350	1450	1413
16/18	Fine	2729	3774039	500	1495	1383
18/20	Medium	4059	5605385	870	1550	1381
20/22	Medium	5145	7067854	665	1555	1374
22/24	Medium	239	306070	610	1370	1281
24/26	Medium	1450	1883539	1200	1450	1299
26/28	Coarse	2399	3543432	1200	1575	1477
28/30	Coarse	336	462714	1100	1575	1377
30/32	Coarse	532	732168	1110	1575	1376
Total		19311	26850274	500	1575	1390

**Table IIa. Transaction of Charka raw silk of different varieties at Bangalore Silk Exchange during January '98**

Varieties	Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
			Min.	Max.	Avg.
Coarse	1159	916930	450	1030	791
Medium	6806	6196714	620	1065	911
Fine	39767	46309247	800	1550	1165
Total	47732	53422891	450	1550	1119



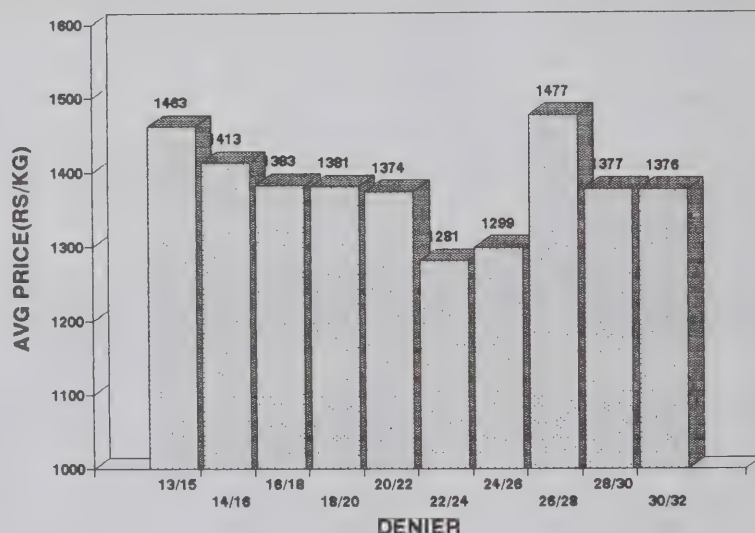
**Table III. Prices of Indigenous Silk**

(Rs./Kg)							
Silk Exchange	Variety	January '98			January '97		
		Min	Max	Avg	Min	Max	Avg
Bangalore Silk Exchange (Karnataka)	Filature/Cottage Basin	500	1575	1390	615	1625	1411
	Charka	450	1550	1119	770	1500	1216
	Dupion	100	900	579	150	980	667
Anna Silk Exchange, Kanchipuram Market (Tamil Nadu)	Filature/Cottage Basin	1050	1365	1283	1180	1450	1342
	Charka	800	1100	929	860	1110	1035

**Table III (contd). Imported Silk (Varanasi Market)**

(Rs./Kg)				
Filature Silk 20/22 dr.	January '98		January '97	
	Min	Max	Min	Max
Chinese	1500	1600	1275	1510
Korean	1540	1550	1250	1480

**Average Prices of Denierwise Filature  
Raw Silk Transacted at Bangalore Silk Exchange**



to January '98 and April '96 to January '97 are given in Table-I. The transaction of raw silk of different deniers of filature/cottage basin and charka rawsilk at Bangalore Silk Exchange during January '98 is given in Table-II. Qualitywise charka rawsilk transaction during January '98 is given in Table-IIa.

#### Prices of sericultural commodities

The prices of different qualities of indigenous raw silk ruled at Bangalore Silk Exchange (Karnataka) and Anna Silk Exchange (Tamil Nadu) in addition to prices of imported raw silk at Varanasi market during January '98 in comparison with January '97 are given in Table - III.

The prices of different varieties of mulberry reeling cocoons quoted at important cocoon markets of southern states viz., Karnataka, Tamil Nadu and Andhra Pradesh are given in Table IV.

**Table IV. Mulberry Reeling Cocoon Prices**

(Rs/kg.)						
State	Market	Variety	January '98		January '97	
			Min	Max	Min	Max
Karnataka	Ramanagaram	Imp. cross breed	90	180	90	174
	T. Narasipur	Ord. cross breed	32	96	32	139
Tamil Nadu	Vaniyambadi	Imp. cross breed	57	135	107	140
	Coimbatore	Imp. cross breed	71	145	98	148
Andhra Pradesh	Hyderabad	Multivoltine	40	156	57	150
	Dharmavaram	Multivoltine	71	190	56	171

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## Correspondence:

Editor,

**Central Silk Board,**

Ministry of Textiles, Govt. of India,

P.B.No. 6825,

CSB Complex, BTM Layout,

Madivala, Bangalore-560 068

Fax: 080-6681511

Ph : 6681513, 6681514, 6689351, 6687808

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Our dynamic research and extension wings are engaged in the upliftment of the socio-economic conditions of the sericulturists of the country and are intensifying their efforts so that the generations of tomorrow may have a bright future

# HOPE IS HERE !



We have added  
a new dimension  
to the economy

**CENTRAL SILK BOARD**



# Integrated Approach for Achievement

**S**ericulture, in comparison to many other farm enterprises, is not only cost-effective but also remunerative with minimum yield gap. The farmer finds it convenient to practise it within his reach. That's how the industry could register an impressive growth over the years and proved to be a net foreign exchange earner. The untiring efforts of the sericulture scientists and various developmental agencies could help the industry to keep up the momentum all along.

Yet, in the last couple of years, it is being reported that the industry has reached a phase of stagnation in terms of production. It may be partially true, as the availability of land and labour for sericulture is becoming scarce besides stiff competition from other crops and thus, affecting the horizontal expansion.

If one could recall, the emphasis on the need to concentrate on the vertical growth of the industry with due importance to the better quality and productivity was laid during the National Sericulture Project, itself. Today, we have all the much required inputs like the infrastructure, man-power and the technology. The farmer can get a technology package that would not only suit the season and region but also meet his specific needs. It holds good for the post-cocoon sector, also. The success lies in the planned and integrated approach in each sector/process to derive the best out of it both in terms of quality and quantity. It also calls for strict adherence to the recommended packages.

But the gap exists and much is expected of the extension machinery to bridge. Often it is observed that the technologies are not adopted in full or neglected and the user has to suffer. There is a felt need to strengthen the sericulture extension network to disseminate the concept of integrated approach. The concepts of lab to land and land to lab should be strengthened further and each sericulturist and silkman should be treated as a resourceful entity to motivate him to achieve the best. No doubt, the sericulture extension is already doing its best through regular and periodical interaction sessions with the sericulturists/silkmen towards this endeavour; yet, much is to be done.

Using all the tools in his kit, an extension worker has to motivate the farmer/silkman not only to plan his activities but also to use all the technologies recommended for a given stage integratedly so that the success is assured. Sericulture will be more remunerative once the silkmen are professional and it is here where the extension plays the key role.

 Editor

### New Terminologies are Relevant!

This has reference to the Letter of Dr. K.V. Anantharaman (**Indian Silk**, March 1998) on the article "Dietary Efficiency and Silk Productivity" by Kanika Trivedy and K. Sashindran Nair (January, 1998).

1. The article never denies that nutritional studies have been conducted on some of the silkworm breeds existing in India. In fact, these data are never referred to by the silkworm breeders. The present work was done as required by the breeders conforming to their preliminary observations.

2. Often the experts and the silkworm breeders felt that the terms ECI to cocoon and cocoon shell are difficult to understand and the dry weight basis calculation does not give a clear picture notwithstanding the value and validity of the information. In turn, it was suggested to convert possible data to wet weight for an easy understanding. Dry weight basis calculation should not be followed blindly, especially when the field is of commercial implication.

3. The terms 'leaf cocoon conversion rate' and 'leaf-silk conversion rate' are not fictitious and widely used in China. In the context of the article, these terms were felt more appropriate and stated that "This arouses a reliable comprehensive physiological character, *Efficiency of conversion of ingested mulberry leaves to silk* or simply leaf-silk conversion rate".

Moreover, the recent research papers in Nutritional Physiology coined the term 'Production Efficiency of Cocoon Shell (PECS)' for ECI to cocoon shell and reiterated that this is the final and

best indicator for evaluating nutritional efficiency. Therefore, it will be highly orthodox to get hold the term coined by Waldbauer in 1960s. Recent developments in this field may be referred to a paper by Machi, M & Katagiri, K (1991) in JARQ 25:202-208.

4. It may be very common to express nutritional indices in dry weight basis but not uncommon to use it in wet weight basis as Waldbaur mentioned, with modification in the procedure and proper care during the experimentation. However, in this case, following parameters on dry weight basis were studied with generally agreed sample size: (a) Ingesta; (b) Digesta; (c) Approximate digestibility; Efficiency of conversion of (d) Ingesta to larval body; (e) Digesta to larval body; (f) Ingesta to cocoon; (g) Digesta to cocoon; (h) Ingesta to shell; (i) Digesta to shell; (j) Consumption index; (k) Reference ratio; (l) Ingesta/g cocoon; (m) Digesta/g cocoon; (n) Ingesta/g shell and (o) Digesta/g shell. The intended popular article naturally did not include elaborate research data.

5. 'Leaf cocoon ratio' is a crude and unscientific index parameter since it solely depends on the leaf offered rather than the leaf ingested. There is no rigid guideline since the quantum of leaf offered is often adhered to and it varies from rearer to rearer.

6. As the article aimed at a comparison among the silkworm breeds/hybrids, any amount of intrinsic error is common to all the breed/hybrids and conversion to 40000 larvae or 100 dfls was not found to be difficult or ambiguous.

**Dr. Kanika Trivedy**  
Senior Research Officer  
CSRTI, Mysore.

### Look before You Leap

Apropos letter of Dr(s). Alok Sahay and R.N. Singh published in March '98 on the article "Blue! The breed is true" (**Indian Silk**, January, 1998), it is to be reiterated that the article was on the reporting of surfacing of Blue muga – colour polymorphism of the prevalent Green muga – which was reported by Dr. S.N. Chaudhuri (1981) no longer in existence for the past 114 years and bred true for 11 successive generations.

Infact, a true breeding morph may not necessarily be predominant in the population. Neither a breed/line/strain/variety is released for commercialisation by CSB without multilocal trial. In the second to fourth paras of the article, the phenotypic expression of Blue breed has been dealt which was the most important parameter in a polymorphic population, breeding method of their maintenance and the trend of a few advantageous characters of commercial importance.

Though the points raised do not have any relevance to the article, it is put forth categorically that,

1. Table 2 did show Blue muga having higher average SR% than the prevalent Green ones while SR% is one of the indices determining silk yield. Indicating performance of Blue muga as commercial crop did not arise as mentioned above and it is maintained at P4 stations meant for maintenance of breeder's stock/great-great grand parent lines.

2. Combining ability test is not mandatory for a population to breed true. In this context, the very definition of the combining ability has to be kept in mind being 'productivity in



crosses' while GCA and SCA are 'the average performance of a strain in a series of crosses' and 'deviation from performance predicted on the basis of GCA'.

3. It is not possible to report segregation from a homogenous population maintained through sib mating, as it has been only two and a half years that blue muga reappeared in the population. Being reared outdoor, the species of muga are greatly influenced by an array of biotic and abiotic factors. Even then some advantageous characters became conspicuous when the blue breed started getting acclimatised.

4. The article does not spell out the superiority of Blue lines over the mid parent. Certain attributes of economic importance of the Blue breed excelled over the prevalent Green ones as par actual for which mating contrivances like diallel and double cross were not necessary. Moreover, it is to be noted that for a double cross, 4 inbreds and F1 are required.

5. The phenotypic expression of Blue breed is same as that of Green breed except larval body colour which cannoted that except body colour they were morphologically same.

The article had been presented conforming to the ethics of scientific decorum by reporting a biological event of value and a concern for further study and exploitation of the event.

Monica Chaudhuri

Senior Research Assistant

Muga Seed Development Project  
Guwahati

#### Printers Devil

In the article "Blue! The breed is true!! published in Jan. '98 issue, in the Table 1, the data under columns 3 and 4 should be read with bacterial while columns 5 and 6 with viral.

— Editor

## Question & Answer

R. Ravi Kiran, Nazarbad, Mysore

**Q 1 :** In silkworm, fertilization is internal or external ?

**A :** When male and female moths of *B. mori* copulate, ejaculation takes place and innumerable spermatozoa enter into the bursa copulatrix of the female reproductive system. Through ductus seminalis, ductus tortuosus, they reach spermatheca and wait for the eggs descending from the common oviduct. Just before the egg is being laid, the spermatozoa move from the spermatheca to the oviduct and enter into the egg through the micropyle. The spermatozoan waits at the anterior part of the egg until the maturation division of egg nucleus is completed.

The first maturation (reduction) division of the egg begins before oviposition and terminates 5–6 minutes after laying of the eggs. The whole process of reduction division takes approximately 90–100 minutes from oviposition (Ohtsuki and Murakami, 1968). As soon as reduction division is completed, only one nucleus will be seen in the egg which becomes a female pronucleus. The female and male pronuclei unite to form the zygote which is called fertilization. This process is completed within 2 hours of deposition of eggs. Hence, the fertilization in silkworm is termed as external as it is taking place outside the body of the silkworm.

**Q 2 :** How does pebrine disease spread transovarially ?

**A :** The transovarial transmission of pebrine disease in the silkworm *B. mori* is already explained in **Indian silk** Vol. 36(10): 1998. For details refer FAO Agricultural Services Bulletin – Silkworm Egg Production (Translated from Japanese Anonymous – Oxford & IBH Publication Limited, New Delhi, 1997 – Silkworm Rearing (Translated from Japanese by K. Veda *et al.*, Oxford & IBH Publication Limited, New Delhi, 1997 – Sericulture Manual – 2 by Krishnaswamy *et al.*, 1979.

## Indian Silk Subscription Revised

*Dear Readers,*

*While there had been a considerable hike in the prices of all the materials and services that go in for production of a magazine, over the previous years, we stood by our commitment to serve the industry and you, even at our cost. But now, we have been forced to price per copy of the magazine at Rs. 20 and the annual subscription at Rs. 240. The overseas subscription will be US \$ 50 (Airmail). This increase comes into effect from April '98 subscriptions. We hope our valued readers will extend their support as ever.*

**Editor**

# Mulberry Pruning Machine

Satish Verma, Mathew John and R.K. Datta

**M**ulberry plants are grown generally in the form of bushes for commercial utilisation. They need to be pruned at regular intervals for good growth and production of nutritious leaves for silkworms. In India the pruning of mulberry plants after harvesting the leaves is carried out manually. Manual pruning (Fig. 1) is not only time consuming, but also involves drudgery. In manual pruning a pruning saw (Fig.1) is used and about 4-5 mandays are required

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***The CSRTI, Mysore has recently developed a power operated mulberry pruning machine to save the time, labour and cost involved in the operation. The machine will be quite useful for large scale cultivation of mulberry say the authors.***

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to prune one acre (10-12 mandays per hectare) of mulberry garden. Manual pruning is economically justified and feasible for small gardens but not for large scale cultivation of mulberry. Moreover, the availability of labourers for farm work is reducing day-by-day as they are being offered higher wages for less painstaking non-agricultural works, in nearby towns and cities.



**Fig.1. Manual pruning of mulberry ( Inset - Pruning saw)**

In manual pruning, it is observed that farmers or labourers prune only the soft branches which lead to the development of a crown at a height of 15 to 20 cm from ground. The crown gives rise to a number of branches which may not have healthy leaves. It is, therefore, imperative to cut the crown periodically for good branching. Cutting crown is an energy and time consuming operation. As it is very difficult to cut the crown, the farmers cut the plant from ground level using hoe or pick axe. This is called as ground level pruning. After ground level pruning, plants take some time to sprout again, thereby delaying rearing of silkworms. In manual pruning, it has also been noticed that a large number of buds are damaged due to peeling of bark, splitting of branches due

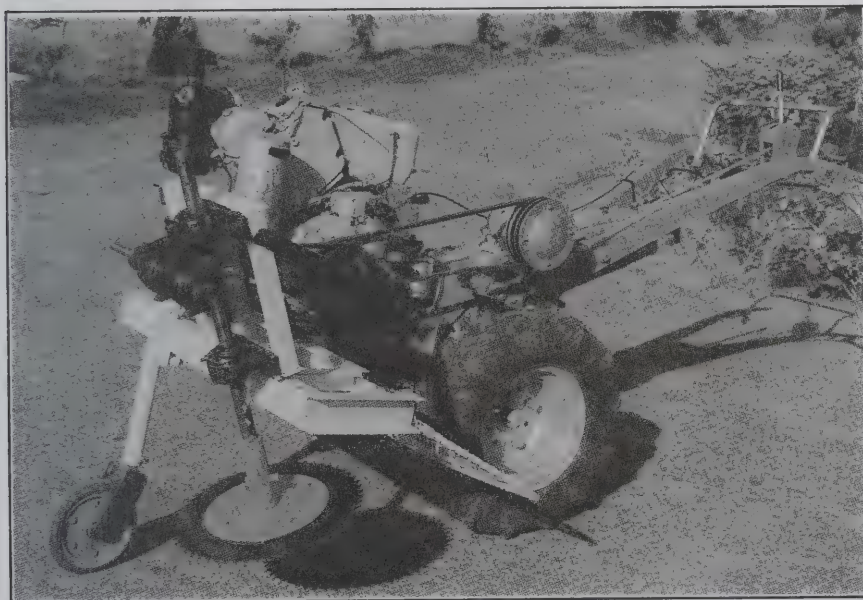
to reduced sharpness and wearing out of the teeth of the equipment used.

The need for the development of an indigenous mechanical pruning device has been felt since quite some time to overcome the scarcity of labourers during pruning period, reduce drudgery involved in pruning operations, avoid formation of crown and minimize the damage to the buds. The Central Sericultural Research and Training Institute, Mysore has developed a power tiller operated mulberry pruning machine, recently.

## **Description of machine**

The mulberry pruning machine (Fig.2) is an attachment to a standard power tiller (Make: Mitsubishi-Shakti). It comprises of:





**Fig.2 Prototype of mulberry pruning machine**

- (a) Frame
- (b) Drive mechanism
- (c) Circular blade
- (d) Support wheel
- (f) Guide
- (h) Guard

**Frame:** A rigid frame comprising of iron angles, flats, channels has been provided to support the drive mechanism, circular blade, support wheel, guide and guard. The frame is rigidly mounted on the power tiller chassis.

**Drive mechanism:** The drive mechanism comprises of shafts, bearing, V-grooved pulleys, belts and bevel gears for transmission from power tiller drive pulley to the circular blade.

**Circular blade:** Circular blades made of stainless steel having 20, 30 and 45 cm diameter could be fixed on the machine for pruning the mulberry plants. The diameter of blade to be fixed on the machine depends upon the girth of plants. Small diameter blade is used for cutting the stem of plants whereas larger blades are for normal pruning of branches and cutting through the crown. A special care has been taken for fixing the circular blade so that it does

not fly-off from the machine during pruning operation. The blade has been fixed in such a way that it approaches mulberry plant at an angle of 15 degrees with respect to ground to give a clean and angular cut and also to avoid polishing of stem, peeling of bark and clogging of shoots under the machine. The speed of the blade depends upon the throttle setting of the power tiller. At idle tiller speed, the blade rotates at around 2000 rpm, 3200 at half throttle

and 4350 at full throttle. The power generated by power tiller at half throttle and blade speed of 3200 rpm are found sufficient for normal pruning operation. The throttle should be raised to full, to provide adequate power and speed to cut thick and aged mulberry stems.

**Support wheel:** A swiveling type wheel has been provided for easy maneuverability and balancing of the machine during operation. The support wheel also serves as a device for adjusting the pruning height. The wheel is mounted on the frame with the help of U-clamps which can be loosened to vary the height of support wheel so as to raise or lower the height of circular blade with respect to the ground.

**Guide:** A guide has been provided in front of the machine to push and direct the plants towards the blade for easy cutting. The guide also bends the plants towards left hand side so that they fall only on one side for easy collection.

**Guard:** A guard has been provided to cover circular blade and avoid any danger to the operator if blade breaks or comes out of the



**Fig.3. Machine pruned mulberry plants - A close view**



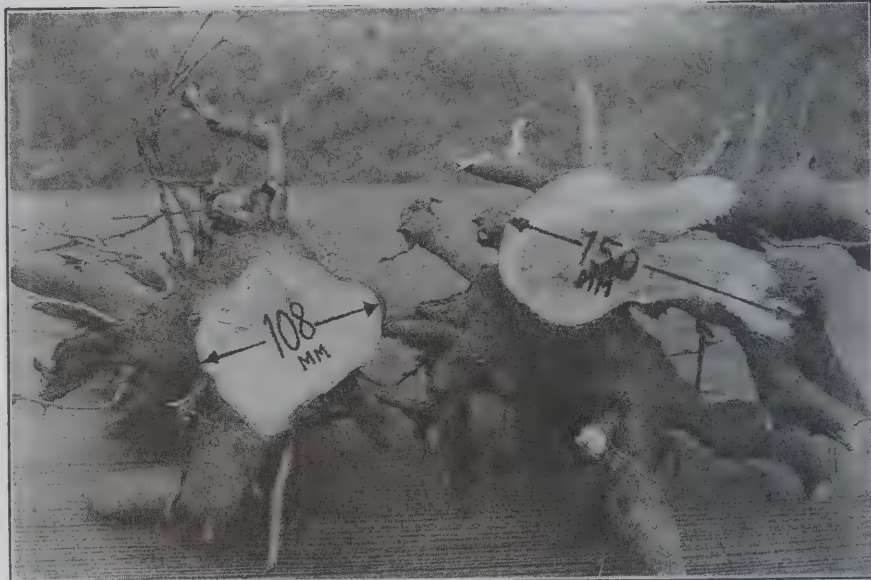
machine during the operation. The guard is fitted with a thick wire mesh so that the operator can see the movement of blade during pruning operation and control the forward movement of machine.

### Operation of machine

For pruning mulberry, the machine should be fixed to the power tiller. Different pulleys and belts should be aligned for smooth operation. Thereafter, a suitable circular blade should be fixed. The machine is then taken to field and aligned in such a way that the center of blade coincides with the center of row of the plants. The machine cuts the mulberry shoots while advancing and lays them on one side. If the shoots are small in diameter, the operator can increase the forward speed of power tiller in order to carry out pruning at a faster rate. Fig.

### Performance

The pruning machine was tested for various pruning operations such as pruning top branches, cutting through the crown and bottom or ground level pruning. It has been observed that machine



**Fig.4. Thick stumps cut by machine**

carries out all these types of jobs with ease. Figs. 3 & 4 show close up views of mulberry plants pruned by the machine. It can be seen that cuts are very neat and clean. The layer of sap around edges shows the cleanliness of cuts. The machine was found cutting the stems easily up to 15 cm (6 inches) in diameter.

The machine can carry out pruning operations in gardens having a minimum row to row spacing of 90 cm (3 feet). The

machine works better in paired row system compared to row plantation (Fig. 5). For turning, a minimum gap of 120 cm (4 feet) should be provided on sides of machine.

The machine was tested for area pruned per hour. It has been found that about 5 hours are required for pruning of one acre of mulberry garden (12–13 hours for one hectare).

The cost of mulberry pruning machine is around Rs. 7,500. The cost of operation of the machine works out to be Rs. 40 per hour including the cost of operation of the power tiller and the wages for the operator. Therefore, the cost of pruning one acre of mulberry by machine will be Rs. 200 (Rs. 250 for manual pruning). Although, there is not much difference in the cost of manual and mechanical pruning, the machine can do the job with ease and at a faster rate without injuring the plants. The machine will not only help in maintaining the timeliness in pruning operations but also be handy for large scale cultivations.



**Fig.5. Mulberry crop in a garden pruned with the machine**

**The authors are with CSRTI, Mysore.**



# Mulberry Cultivation Technology for Manipur

N. Ibohal Singh and P.K. Srivastav

**T**he small picturesque state of Manipur is situated on the North-eastern boundaries of India. This hilly state lies between the latitude 23.80°N to 25.68°N and longitude 93.03°E to 94.78°E. It is bounded by Naga hills of Nagaland in the North, Somara tract and Upper Chindwin areas of Myanmar in the West, Chin hills of Myanmar and Mizo hills of Mizoram in the South and Cachar

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***Mulberry Sericulture industry in Manipur though had a long tradition, was confined to a few pockets of the state. Of late, the industry is gaining momentum because of its employment potential. The authors spell out an appropriate technology for successful cultivation of mulberry, suitable to the state.***

---

and North Cachar hills of Assam in the West. The altitude of the state ranges from 785 m to 2800 m ASL. The total area is 22,356 km of which hardly 3673 km constitutes the valley area. There are nine districts in the state out



**Mulberry plantation in Manipur**

of which Senapati, Churachandpur, Ukhrul, Tamenglong and Chandel are five hilly districts while Thoubal, Bishnupur, Imphal East and Imphal West are four valley districts. Most of the districts have hilly terrain with gradient from 15° – 45° and the hills constitute 90% of the total area in the state. The alluvial plains of Imphal valley is thickly populated and almost all arable land is under paddy cultivation. Majority of the hill areas are inhabited by tribals.

## **Soil and Climate**

The soil of Manipur valley is primarily clayey loam or loamy clay and rich with humus whereas hill soil is red laterite to blackish loam type. The pH of the soil ranges from 4.5 to 6.2.

Manipur lies in the monsoon belt of the world climatic classification. The western part experiences tropical climate till March, upto South-east corner. Rest of the area has subtropical climate with distinct summer and rainy seasons. The period from February to November is characterised with low temperature and heavy dew during nights. During April and May, temperature rises in the day which often cools down after afternoon. Heavy rainfall is observed between June – September. The annual rainfall ranges from 1200–1500 mm which sometimes reaches upto 2300 mm. The maximum and minimum temperature throughout the year varies between 17° – 38°C and 7 – 1°C respectively while relative humidity ranges from 54% to 90%.





**Mulberry pruning in progress**

### Sericulture in Manipur

The agro-climatic conditions are quite congenial, hence sericulture industry in Manipur has a long tradition; but remained confined to some pockets viz., Khurkhul, Thongjao, Leimaram, Phayeng etc. Silk weaving industry was confined to another four villages viz., Chingmeirong Kabo Leikai, Thangmeiband, Awang Kongpal and Maibam Leikai only. The industry gathered new momentum with the establishment of a separate Directorate of Sericulture in 1980s and a Grainage-cum-Extension Centre for mulberry at Imphal in 1986-87. The basic objective behind the establishment of the latter was to supplement the supply of Dfls/chawki worms in Manipur. Initially, nearly 50 demonstration Centres were established at individual farmers level with a half-an-acre land for mulberry plantation and Rs. 5000 was paid to each farmer as establishment cost towards plantation, rearing house, rearing appliances and chemical fertilizers etc. Planting was done at 3'x3' spacing with  $S_1$  and  $K_2$  varieties. The leaf yield under rainfed conditions ranged between 12500 kg/ha/yr to 15000 kg/ha/yr

in well-maintained farms. However, 4'x4' spacing has resulted in rapid growth as well as more leaf yield. In the gentle stooey hills, terrace type of plantation has been initiated at a spacing of 6'x6' or 8'x8' as medium or high bush plantations. High yielding varieties like BC-259, TR-4 and S-1635 are being propagated on the hills. The multilocal varietal trial experiments are underway to draw concrete conclusions.

Silkworm races like  $NB_7$ ,  $NB_{18}$ ,  $NB_4D_2$ ,  $KA$ ,  $P_5$  etc., have been tried for the last 7-8 years and all are performing at par, though  $NB_7$  and  $NB_{18}$  have exhibited an edge over other races. The cocoon yield ranges from 40-45 kg/100 dfls in the fields. Recently, Bi x Bi dfls of  $NB_7$  x  $NB_{18}$  and its reciprocal have also been prepared and supplied to state department and commercial rearers. Further, multivoltine races like PM (Pure Mysore), Nistari (N),  $MY_1$  and G are also under trial. For summer rearing during May or June/July, multi x Bi (C.B.) or Multi x Multi have also been prepared for multilocal trials. Recently, Manipur Government has got an aid of Rs. 490 crore from Japan for rapid expansion

and development of sericulture in the state. This project effective from 1998 shall continue for about a decade. Currently, the silk production level is 212 MT which is likely to rise upto 783 MT per year, during the ninth plan period, according to the Sericulture Department of Manipur.

The commercial importance of mulberry sericulture is being realised gradually and people are raising mulberry gardens with improved varieties like  $K_2$ ,  $S_1$ ,  $S_{54}$ ,  $BC_{259}$ ,  $TR_4$  and  $S_{1635}$ , suitable for hilly and valley regions, respectively.

### Mulberry cultivation technology

The mulberry cultivation technology suitable for Manipur State is as follows:

**Soil amendment technology:** The quality and quantity of silk produced depends on the quality of mulberry leaf, yield and several other factors. Edaphic conditions among the major factors control qualitative as well as quantitative production of mulberry leaves. Hence, optimum production may be obtained by resorting to recommended package of practices.

Deep, fertile, well-drained, friable, porous, clayey loam to loam soil with good moisture holding capacity and slightly acidic (6.2 to 6.8P) nature are ideal for mulberry growth. As stated earlier, the soil of Manipur is clayey loam to loamy clay and that of hills is red laterite to blackish loam type which is acidic (4.5 - 5.0 pH) to slightly acidic (5.0 to 6.2 pH) in nature. It is highly suitable for mulberry cultivation. Where pH of the soil is 4.5 to 5.0, application of lime is moderately desirable whereas in case of pH of the soil is 5.1 to 5.6, lime application is less desirable. Above 5.6 pH, application of lime is not required.



The lime requirement of soil is calculated from hydrolytic acidity (Hh) (expressed in milliequivalents/100gm of soil) multiplied by co-efficient of 1.5. Hence, quantity of lime required = Hh of soil x 1.5 ton/ha. Soil solution pH may be upgraded to slightly basic level by neutralizing 2/3 of hydrolytic acidity. Therefore, lime should be applied @ 2/3 of calculated requirement.

The lime may be applied in full rate at once or in two split doses at 6–7 years interval. Lime fertilizer should be broadcast in powder form on soil surface followed by deep ploughing. Liming can also be done after plantation by applying full rate of lime around individual trees or between rows, but result is slow. Alternatively, calcium ammonium nitrate (CAN) or ammonium sulphate instead of urea may be applied in the plantations for increasing soil reaction (pH).

Mulberry is versatile plant, hence it can grow on any land except submerged or very steep lands. Hence, proper draining of water in case of submerged land and proper soil conservation methods as well as contour drains, contour planting or bench terracing in case of very sloppy or steep lands are necessary.

**Plantation technology:** After amelioration of soil, the land should be prepared by deep ploughing upto a depth of 30–35 cm, taking the advantage of pre-monsoon showers or else, the soil amelioration may be undertaken simultaneously to save mandays. The land may be ploughed 2–3 times and all the weeds and stones are cleaned out. Pits of 35x35x35 cm size should be prepared at 3'x3', 4'x4' or 6'x6' spacing and left for aeration for few days. Subsequently, 5–10 ton/ha. of farm yard manure/cow dung/poultry manure should be applied



**Mulberry plantation after the pruning**

in pits followed by planting of 3 cuttings in a triangular form at 15 cm spacing from each other forming an equilateral triangle. Where land is clayey sand may be mixed alongwith manure. The cuttings should be prepared from 10–12 mm diameter branches which are fully grown and of 9–12 months old. The size of the cuttings may be nearly 20 cm long with 4–5 living buds and at least one bud should be exposed outside the pit during plantation. Alternatively, one sapling/pit should be planted deep in the soil for better establishment. The saplings may be raised by planting cuttings in 20 x 8 cm spacing in nursery beds of 2.4 x 1.2m size to accommodate 200 cuttings/bed. In each nursery bed, Vesicular Arbuscular Mycorrhizae (VAM) viz. *Glomus fasciculatum* or *G. mosseae* or phosphatica obtained from reliable sources may be poured in furrows of about 6" deep from one end to another end of each row at a distance of 20 cm between the furrows. Subsequently, the bed should be irrigated to keep bacterial cells alive. VAM or phosphatica increases phosphorus utilization efficiency of the saplings and enhances their growth. Urea

can be used @ 0.5 kg/bed only after 2–3 months of plantation of cuttings in the nursery.

Utmost care is required to level the land thoroughly after the plantation and excess rain water should be drained out to avoid water logging. Plantation should be watered at regular intervals in the absence of rains, if possible. First weeding should be undertaken at least 45 days after the planting and afterwards as and when required because they interfere with the growth of mulberry drastically. After the rainy season, the dried weeds, mulberry twigs and paddy straw/husk etc. may be applied as mulches for moisture conservation and maintenance of temperature in the soil during the winter season. Mulching checks the growth of weeds and also enables mulberry plants to utilize natural resources efficiently without any competition and allelopathic reactions in the soil.

The recommended dose of fertilization for Manipur which yields 15000 kg/ha mulberry leaves is 100:50:50 per ha. in two split doses as it is strictly a rainfed area. The first dose is of 20 kg. N: 20 kg. P: 20 kg K and second is of 20 kg. N alone per acre is applied 3–4 weeks after pruning and after second leaf harvest



respectively. The fertilizer application should be done around the plants forming a ring at a depth of 6–9" and then mixing it with soil by a fork or stick.

The first harvesting of leaves may be undertaken after six months of planting whereas the second is after 10 months of plantation. In some areas of the state, where irrigation facility is available by natural spring or tube well etc. NPK may be applied at the rate of 300:120:120 per ha. per year in two split doses as recommended by Central Sericultural Research and Training Institute (CSRTI), Mysore and Berhampore. Irrigation after fertilizer application should be given within a week.

**Pruning:** Conventionally, farmers are maintaining mulberry plantations in their available back yards or small plots in the form of trees or bushes for getting more leaves. However, in the case of systematic plantations at standard spacings, systematic pruning should be resorted to get more succulent leaves. Two types of pruning such as bottom pruning at a height of 30 cm. or middling at the height of 60–90 cm. are practised. Bottom pruning is generally done during May – June and October – November for autumn and spring crop rearings whereas for rest of the crops, farmers practice leaf plucking combined with middling.

### **Biotechnological innovations**

Application of biofertilizers like VAM and biological nitrogen fix-

ing bacteria like *Azotobacter chroococum* and *Azospirillum* have been found to reduce the use of phosphate and nitrogenous fertilizers upto a level of 50% at CSRTI, Mysore without affecting the mulberry leaf yield. Further, application of 10–20 kg *Azotobacter* + *Azospirillum* mixture and 10–20 kg phosphatica alongwith 50% reduced chemical nitrogenous and phosphate fertilizers provided same quantity of leaf yield as compared to full dose of NPK chemical fertilizers and it was true in case of Oak plantations also. Hence, use of biofertilizers in Manipur in combination with 50% reduced urea and SSP shall not only be economical but also reduce soil pollution and enable the soil to sustain fertility as well for a longer period.

In Manipur, VAM is not marketed and Regional Directorate of Biofertilizer is supplying phosphetica. As much, VAM may be substituted by 10 kg phosphatica (@ Rs. 20/- per kg) at 25 kg of P/ha./yr. which saves Rs. 520/- per ha. per year. Likewise, only 10 kg *Azotobacter chroococum* costing Rs. 200/- and 50 kg. of N/ha./yr. instead of recommended 100 kg. N/ha./yr. used in two split doses after every crop harvest/pruning shall save atleast Rs. 200/- per ha. per year. Before use, 2.5 kg *Azotobacter chroococum* (or a mixture of 1.25 kg. *Azotobacter* + 1.25 kg *Azospirillum*) in combination with 2.5 kg. phosphatica should be mixed with powdered 100 kg. dry

manure per ha. and should be applied between the rows of mulberry near root zones in furrows which should be covered immediately. Biofertilizer application should be made either 15 days earlier or 15 days after NPK application. Irrigation is must to keep the bacterial cells alive. Potash may be used @ 50 kg/ha/yr as usual.

FYM may be used @ 10 ton/ha/yr in order to improve soil structure, texture and fertility after weeding and digging thoroughly. Weeding and FYM application should be attended just after pruning of leaf harvest at the commencement of the monsoon. The pruning should be done at 30 cm. above ground for better aeration and prevention of submerging of the stem during heavy rainfall.

*Sesbania rostrata*, an annual fast growing crop with shoot and root nodules, *Tephrosia* sp., *mimosa pudica*, *crotalaria* and *Indigofera* species growing profusely during rainy seasons may also be utilized as green manure. Further, short duration crops of leguminosae family viz., Urid beans (70 days), Soya beans (90 days), Rajmah, Cowpea and vegetables like Ginger, Chilli, Brinjal etc. may also be grown as intercrops between mulberry bushes to get additional income. Intercropping also helps in checking the weeds and enhances fixation of nitrogen in the soil, if they are legumes.

*The authors are with RTRS, Imphal.*

## **Silk Exporters, Merchants and Retailers**

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# Management of Zinc in Mulberry

N.R. Singhvi, M. Munirathnam Reddy and F.B. Srinivasan

**Z**inc (Zn) is an essential micronutrient to produce the optimum crop yield. Zinc is one of the first essential micronutrient for both plants and animals. Zn deficiency has been reported on a very extensive scale in India. Where soils are not giving good response to crop inspite of full application of recommended NPK doses, small doses of Zn application improves the growth and yield of various crops. The response of Zn in mulberry has been fully recognised from the common point of view.

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***In view of wide spread deficiency of Zn and its importance in sericulture, various aspects of Zn has been discussed here to assist and guide extension agencies/ farmers in diagnosing and remedying Zn deficiency in mulberry.***

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## **Reasons for Zn deficiency**

The total Zn content in Indian soils varies from 2 to 1205 ppm. However, the mobility, thus availability of Zn in soil is influenced by soil pH, absorption of clay organic matter content and other soil component.

**Soil pH:** In high pH soil, availability of zinc is reduced due to absorption or precipitation of zinc or due to some changes in the soil solution by increasing the solubility



**Fig. 1 : Mulberry garden just before Zn application**

of antagonisticious which cause non-availability of the zinc in the soil. The solubility of Zn decreases by 100 ppm per unit rise in soil pH. As such, Zn deficiency is frequent in alkali or calcareous soil having pH value above 7.5. In addition to moderating the absorption or precipitation of zinc in soil, pH may alter the uptake of zinc through an effect on microbial activity and change in the ability of the plant roots to absorb or to transport, to the tops, the absorbed ions.

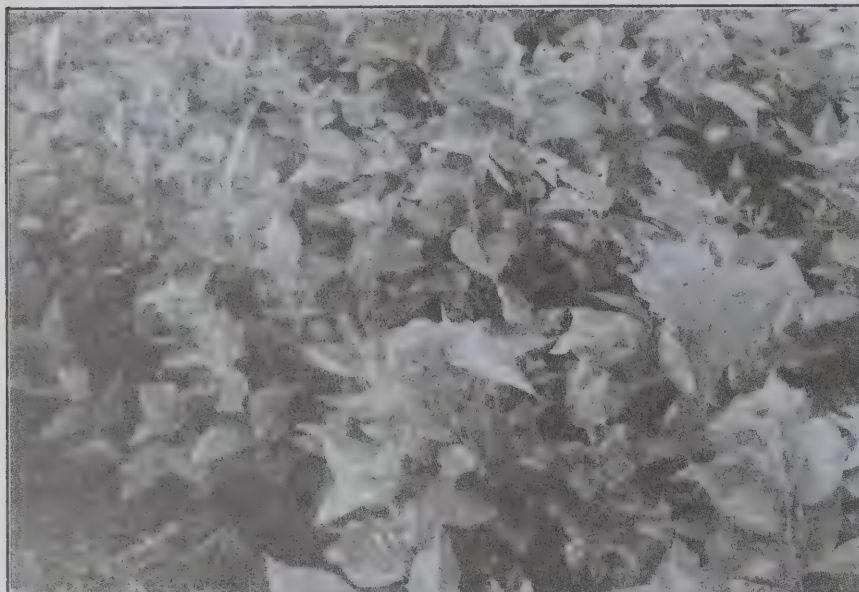
**Organic matter:** In soils where organic matter is low, there is always possibility of Zn deficiency as there is no scope for complexing the substances which are responsible to fix the zinc.

**Temperature:** Cool soil temperature has frequently been associated with an increased incidence and severity of Zn deficiency. Root elongation and nutrient uptake are diminished in cool soils, thus re-

ducing the effective root zone and the availability of Zn from organic matter is reduced through retarded rates of mineralization.

**Modern cultivation practices:** Modern technology of increased crop production per unit area is one of the important reason for increase of zinc deficiency in soil. Due to such high intensity of cropping with high yielding varieties, heavy amount of essential nutrient elements are removed from the soil. In India during the last three decades, to replenish dwindling nutrient reserves, NPK fertilizers has been supplied to soil but little attention is paid to other nutrients, especially Zn micronutrient. Consequently, the deficiencies of Zn and other micronutrients emerged in 1960s, it has reached an alarming situation in case of intensively cultivated areas.





**Fig. 2: Mulberry garden after few days of Zn application**

### **Important functions of Zn in plants**

- Helps in transformation of carbohydrates
- Regulates the consumption of sugar in plant
- Vital for the processes of oxidation in the plant cell
- Essential in several enzyme system that regulate various metabolic activities in plants
- Plays a role in nucleic acid and protein synthesis
- Helps in utilization of N and P in plants. A synergistic or additive effect of Zn along with other nutrients at optimum concentrations on plant growth and yield has been indicated by various studies in different crops. Kumar *et al.* (1985) observed that N and Zn show synergistic effect and the best yield can be obtained with the optimum concentration of both. When this optimum combination of N and Zn is disturbed, the yields decrease (Dev and Shukla, 1980; Gupta and Potalia, 1990). The application of Zn has been reported to increase N concentration in different crops indicating synergism between the two nutrients.
- Zn deficiency inhibits uptake of water causing stunted growth,

and

- Zn deficiency also retards photosynthesis and nitrogen metabolism.

### **General symptoms of Zinc deficiency in mulberry**

Prominent symptoms of Zn deficiency in mulberry (Chakraborti *et al.*, 1994-95) are:

- Reduced leaf size
- Leaf showing symptoms of prominent chlorosis towards veins. There is a close relationship between Zn and chlorophyll formation.
- Ceasation of overall plant growth.

### **Importance of Zn**

Zn has been reported to play an important role in growth and yield of mulberry. Foliar application of zinc has been reported to show promotary effect on morphological and quality characters of mulberry leaves (Singhvi *et al.*, 1996) and leaf yield (Lokanath and Shivashankar, 1986; Bose *et al.*, 1994). Increase in pupal wt. was noted in silkworm fed on mulberry leaves treated with zinc @ 5 kg/ha (Lokanath and Shivashankar, 1985). Increase in effective rate of rearing was observed with Zn

sprayed leaves at 5 kg/ha where maximum efficiency of 80.5% was recorded when compared to other elements (Vishwanath and Krishnamurthy, 1982). It was observed that feeding bivoltine hybrid (NB<sub>4</sub>D<sub>2</sub> x NB<sub>7</sub>) with Zn treated leaves significantly increased larval weight and cocoon weight. Bose *et al.* (1995) found that by feeding Zn treated leaves, cocoon yield of NB<sub>18</sub> x NB<sub>7</sub> bivoltine hybrid increased significantly and there was an improvement in various quantitative traits. Work done by other scientists also establishes the essentiality of Zn in mulberry and silkworm nutrition, growth, development and yield.

### **Amelioration of Zn deficiency**

Among various sources of Zn, zinc sulfate (ZnSO<sub>4</sub>) is the only commercially available zinc fertilizer. For the application of (ZnSO<sub>4</sub>) various methods like soil application and foliar spray have been recommended. Studies in various crops have indicated that there is no substitute for soil application. In India in case of mulberry, development of specific recommendations for soil application of Zn is still in its early stages. Pilot studies carried out at CSR&TI, Mysore has indicated that soil application of 62.5 kg/ha/yr of ZnSO<sub>4</sub> resulted in improvement of leaf yield upto 25% and hence it can be applied in mulberry gardens. For better results, it is advised to apply ZnSO<sub>4</sub> along with FYM as far as possible. However, in alkali soils foliar spray is preferred over soil application to correct Zn deficiency, if it appears during growth period. When standing mulberry crop shows Zn-deficiency symptoms, spraying of ZnSO<sub>4</sub> @ 8.8 kg/ha/crop is a recommended practice to correct the zinc deficiency.

**The authors are with CSR&TI, Mysore.**



# Silk & Milk :

## Participation of Farm Youth

Lakshmi Raju D. and M.S. Nataraju

**O**ften, it is observed that the farmers take up dairying and sericulture as a joint venture due to small holdings, erratic rainfall, unrealistic market and price for the produce and meagre income from crops, these additional enterprises provide additional income and gainful employment to the members of their

***The creativity and the potentiality of the rural youth is rather under utilised in our country. The author emphasise on the need for designing more specific project, for the farm youth that could put their ability to best use.***

families throughout the year. Young members of farm families plays an important role in managing such enterprises. A study was done to know the extent of participation of rural youth in different activities of dairy and sericulture and also their socio-economic characteristics. The finding of the study would help in designing the youth projects better.

**Table 1. Socio-economic characteristics of farm youth**

Characteristics	Category	No.	Percentage
Age	Below 20 years	16	20.00
	21-25 years	32	40.00
	Above 25 years	32	40.00
<i>Education</i>			
Illiterate	—	8	10.00
Primary	1-7 years	29	36.25
High school	8-12 years	23	28.75
College	Above 12 years	20	25.00
<i>Family size</i>			
Small	<5 members	44	55.00
Medium	6-9 members	31	38.75
Big	10 members & above	5	6.25
<i>Farm size</i>			
Marginal	<2.5 acres	30	37.50
Small	2.6 to 5 acres	32	40.00
Big	More than 5 acres	18	22.50
<i>Family income</i>			
Low	<5000	12	15.00
Medium	5001-10000	—	—
High	>10000	68	85.00
<i>Farming experience</i>			
Low	<5 years	48	60.00
Medium	6-10 years	20	25.00
High	>10 years	12	15.00
<i>Extension contact</i>			
Low	<4 score	40	50.00
Medium	5-8 score	28	35.00
High	>8 score	12	15.00
<i>Extension participation</i>			
Low	<4 score	36	45.00
Medium	5-8 score	36	45.00
High	>8 score	8	10.00
<i>Social participation</i>			
Low	<4 score	36	45.00
Medium	5-8 score	36	45.00
High	>8 score	8	10.00
<i>Mass media participation</i>			
Low	<6 score	16	20.00
Medium	7-12 score	24	30.00
High	>12 score	40	50.00

**Table 2. Participation of farm youth in dairy activities**

Activities	Supervision		Self-doing		Assistance		Non-participation	
	No.	%	No.	%	No.	%	No.	%
Selection of animals	—	—	12	15	40	50.00	28.00	35.00
Management of cattle	—	—	12	15	38	47.50	30.00	37.50
Management of cattle shed	—	—	12	15	40	50.00	28.00	35.00
Feeding	—	—	12	15	44	55.00	24.00	30.00
Milking	—	—	12	15	39	48.75	29.00	36.25
Artificial breeding	—	—	12	15	36	45.00	32.00	40.00
Calf rearing	—	—	8	10	50	62.50	22.00	27.50
Health care	—	—	8	10	53	66.25	19.00	23.75
Preparation of milk products	—	—	8	10	55	68.75	17.00	21.25
Marketing	—	—	12	15	49	61.25	19.00	23.75

## Methodology

Sidlaghatta taluk in Kolar district of Karnataka is known for both milk and silk. The taluk has highest milk and silk production in the state. Two villages *viz.*, Bomanahalli and Davaramallur of the taluk were selected for the study. A total sample of 80 farm youths, forty from each village, was selected randomly. Pretested interview schedule was used to collect data which was processed with percentage analysis. The extent of participation of farm youth was assessed in terms of supervision, self doing, assistance and non-participation. Youth refers to the male in the age group of 15–30 years.

## Findings

**Socio-economic characteristic of farm youth:** It could be seen from Table 1 that more than 75 percent of them are illiterate, the rest had primarily, middle, high school and collegiate education. The main occupation of the respondents was agriculture. They also had subsidiary occupations

like sericulture and dairy to boost up their income.

Further, it could be seen that more than 50% of the respondents had a family size of less than 5 members, followed by medium size family of 6 to 9 members, indicating that a majority of them live in single family than joint family. Most of the rural farm youth belong to small (40%) and marginal farmers (37–50%). More than 80% of the respondents had an annual income of over Rs. 10,000/- per year from all sources. Most of rural farm youth possessed a farming experience of less than 5 years (60%) indicating that majority of them had started doing farming after discontinuing their education. Around half of the farm youth had low level of extension contact (50%), extension participation (45%) and social participation (45%). However, medium to high level of mass media participation was observed with large percentage of farm youth (80%) indicating that they try to gather information by reading papers, books, listening to radio, watching

TV programmes etc. This clearly shows that the youth are not much involved in extension activities which is very essential to improve their knowledge. To boost up the farming knowledge of the youth, more extension programmes have to be organized.

**Participation of farm youth in dairy activities:** In respect of dairy enterprise as shown in Table 2, the findings reveal that most of the rural farm youth participate in almost all the dairy activities either with the assistance of family members or by themselves (60 to 80%). It is interesting to note that a large number of farm youth participate in activities in the order of preparation of milk products, health care, calf rearing, feeding, maintenance of records, selection of animals, management of cattle shed, selection of animals, milking, marketing management of cattle and breeding aspects. Besides, it is also observed that a good percentage of farm youth (21.25–40.00%) do not participate in dairy activities mainly due to lack of freetime, as they are continuing their studies.

**Participation of farm youth in sericulture:** It is quite interesting to note that more than 75% of the rural farm youth participate in sericulture activities either by themselves or by assisting their family (Table 3). Unlike in dairy/husbandry, their participation in sericulture is more in terms of 'self doing' than 'assisting family members'. The activities in which the rural farm youth participate are in the order of bed cleaning, distribution of worms to trays, decoconing, grading and marketing, feeding activities, use of disinfectants, plucking/shoot feeding, pest and disease management, selection of mulberry varieties, chawki rearing, temperature and humidity maintenance. In the



**Table 3. Participation of farm youth in sericulture**

Activities	Supervision		Self-doing		Assistance		Non-participation	
	No.	%	No.	%	No.	%	No.	%
Land preparation	—	—	48	60.00	20	25.00	12	15.00
Selection of mulberry varieties	—	—	40	50.00	24	30.00	16	20.00
Selection of DFLs	—	—	16	20.00	40	50.00	24	30.00
Use of disinfectants	—	—	48	60.00	20	25.00	12	15.00
Chawki rearing	—	—	36	45.00	28	35.00	16	20.00
Feeding activities	—	—	40	50.00	28	35.00	12	15.00
Temperature and humidity maintenance	—	—	52	65.00	12	15.00	16	20.00
Plucking/shoot feeding	—	—	48	60.00	16	20.00	16	20.00
Pest and disease management	—	—	44	55.00	20	25.00	16	20.00
Bed cleaning	—	—	56	70.00	12	15.00	12	15.00
Distribution of silkworms to trays	—	—	56	70.00	12	15.00	12	15.00
Decocooning	—	—	48	60.00	20	25.00	12	15.00
Grading and marketing	—	—	48	60.00	20	25.00	12	15.00

activities like selection of dfls rearing, selection of mulberry varieties, pest and disease management,

involvement of rural youth is very less; may be due to lack of knowledge of these activities.

The study revealed that the majority of the farm youth belonged to the age group of 21 to 30 years, educated, living in nuclear families, of small and marginal farm families, having an annual income of more than Rs. 10,000 with a farm experience of less than 5 years. Their participation in social and extension activities is less but in mass media activities is high. Most of the farm youth participate in dairy activities by assisting the family members and only 10–15 % have taken up themselves. In sericulture, majority of the farm youths' participation is through self doing rather than assisting their family members. This implies that more number of educational activities involving training have to be conducted in rural areas. Mass media channels must be effectively utilized to reach large number of farm youth. The socio-economic characteristics of youth must be kept in mind while developing programmes for rural youth.

*The authors are with office of the Assistant Director of Agriculture, KSDA, Sidlaghatta, Kolar District, Karnataka and University of Agricultural Sciences, Bangalore, respectively.*

### CSB Literature

In the background of growing interest in sericulture and silk industry in the country, there appears to be considerable demand for sericulture related literature. The Central Silk Board, in its service to the community of sericulture and silk industry publishes from time to time brochures, books, periodicals not only in English and Hindi but also in many Indian languages. Educative video cassettes on various technologies in Indian and foreign languages help you practise sericulture the right way.

For details, please refer to Indian Silk.

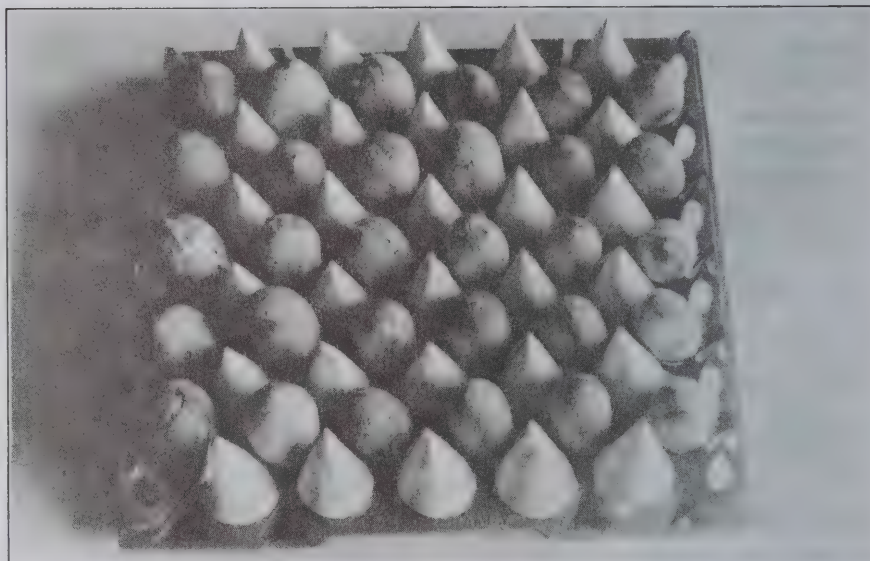
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# Tiwari Grainage Tray : A Breakthrough in Tasar Seed Preparation

S.K. Tiwari

**T**he development of tasar industry depends on various sectors of production viz., seed preparation, rearing and post-cocoon practices and in the context of further growth, modernization is the need of the hour. The existing integrated technology of seed preparation has traditional craftsmanship i.e., uses of mud houses, preservation of cocoons in garlands, oviposition in earthen cups with an aim to suit the need of cultivators and sustainable use of local materials. The tasar seed preparation is being carried out by the state and central government agencies in an integrated seed multiplication and supply system. Under the system, the organised sector i.e., composition of the State Department of Sericulture and Research Extension Centre, Basic Seed Multiplication and Training Centre of Central Silk Board has to produce considerable quantity of seed cocoons which does not prove economical and results in higher unit cost of production of dfls. This attributes to labour cumbersome technology, poor utilization of grainage space and rising cost of inputs.

The parameters for good grainage are, achieving less pupal mortality followed by preservation, synchronised emergence, optimum use of female moths, better egg



**Fig. 1. Placement of seed cocoons in TGT**

laying coefficients of mated moths and lastly, better hatching percentage. Thus, the success of the various operations involved in seed preparation is ultimately judged by its technical applicability and cost-efficiency.

## **TGT - An innovation**

To minimise the huge engagement of labour for garland preparation, difficulties in sorting of cocoons and operational cumbersiveness, a tray has been designed to meet the various requirements of the grainage operations *in situ* and named as "Tiwari Grainage Tray (TGT)".

The tray can be used for trans-

portation, preservation and conditioning of the live cocoons in cold storage.

## **Fabrication**

The tray is made up of plastic or Poly Vinyl Chloride (PVC) of 2-4 mm thickness and its size is 33.50 x 32.60 cm or in a proportionate dimension at the top, there are minimum 6 x 5 rows of sockets which can be proportionately altered preferably by 7 x 6 sockets.

The cavities are represented in two parallel concentric circles measuring 2.4 and 1.1cm as outer and inner dimensions respectively at bottom. The inter-socket



**Table 1. TGT - Evaluation of grainage behaviour**

Parameter	Sex	TGT	Control	't' value	(Mean $\pm$ SE)	
					Probability of significance	Df.
Emergence efficiency/day	M	4.4 $\pm$ 0.49	5.6 $\pm$ 0.38	1.93 NS	P 0.05	02
	F	3.9 $\pm$ 0.17	4.6 $\pm$ 0.56	1.20 NS	P 0.05	02
Mean emergence of crippled moth/day	M	0.46 $\pm$ 0.09	0.32 $\pm$ 0.05	1.40 NS	P 0.05	02
Moth mortality/day in oviposition	F	0.92 $\pm$ 0.21	2.28 $\pm$ 0.54	2.35*	P 0.05	13
Egg laying co-efficient	F	77.69 $\pm$ 4.90	79.17 $\pm$ 9.37	0.15 NS	P 0.05	07
Pupal mortality	-	7.77 $\pm$ 2.37	26.63 $\pm$ 2.33	5.07*	P 0.05	02

distance between two sockets and row to row is 2 cm.

(i) *Inverted Cones*: There are minimum 6 x 5 inverted cones with 1 cm distance between two cones in a plate. However, in 6 x 7 rows of inverted cones, higher number of egg layings can be accommodated per unit area as well as bottom tier for cocoon preservation.

(ii) *Expression*: Inverted cones measuring 3.8 and 2 cm as lower and upper width have a height of 3.5 cm. There is perforation of 1.25 mm uniformly distributed in 2.5 cm basal area of the detachable inverted cones. The two trays are interlocked by cylindrical elevations in inverted cones in second row of placement component side. The elevations are alternate to the blunt end cones.

(iii) *Placement Components or Hanging Components*: They are totally 8, four each in two sides of tray. They are having triangular configuration containing centric holes of 0.5 cm while the two inner triangles have diagonal grooves to accommodate nylon rope while keeping the tray in column as helves. It is used for proper placement of trays while in column.

At the bottom, reverse sockets have been represented with concentric parallel circles measuring 2.61 and 1.60 cm, respectively.

The cones are placed between four quadrangular reverse socket space which forms the egg laying apparatus. The two cones are separated by an intersecting wall of 1.5 cm height. The total volume of egg laying apparatus is estimated to be approximately 50 cm<sup>3</sup>. Placement components at the bottom and top are same.

### Application and Working Efficiency

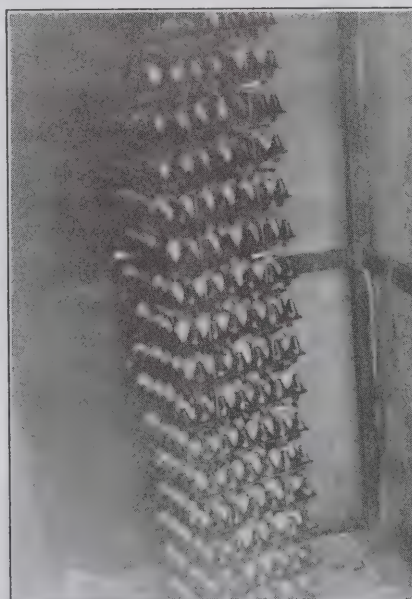
The TGT is having provisions for transportation of live cocoons, conditioning in cold storage, preservation of seed cocoons, moth emergence, oviposition, moth examination, drying of disinfected

eggs and its transportation.

### Transportation

The existing practice for small distance transportation is manual. The garland of cocoons are hung on both sides of a stick kept on shoulder of the carrier avoiding overcrowding, whereas for long distances, cocoons are hung either in loose or garland form/from the ceiling of the rear position of jeep. For bulk transport, trailer is also used and the cocoon garlands are arranged in tier system on bamboo frames. Each tier is padded with leaves and small twigs at the bottom.

On the contrary, the TGT is useful as a packing material for live cocoons for small or long distance transport. While transporting seed cocoons, utmost care is to be taken to prevent the loss due to jerks and direct sunlight. The peduncles are removed from the seed cocoons and are placed in inverted interconal space, with peduncle end upward. The elliptical shape and placement in sockets with interconal space between inverted cone walls check the jerk and injury to cocoons. This tray can accommodate 30 or 42 cocoons in each tier. 10-15 trays are placed one over another with interlocking device of cylindrical elevation which does not allow them to displace. For more safety, the consignment can be tied with



**Fig. 2. Placement of TGT in column while cocoon preservation**

**Table 2. TGT and Projected variable capacity of bearing of seed cocoons in grainage**

Height of column/stand	Floor area (sq ft.)	No. of column floor area	No. of Iron stand required		Inter space (inch)	No. of trays per column (No.)	No. of TGTs required	Preservation capacity (No.)		Preservation capacity of cocoon in unit over one sq. ft (No.)	
			Two pronged	Three pronged				Prototype @ 60	TGT @ 72	Prototype	TGT
7'	30x20	356	134	84	5	16	5696	3,41,760	4,10,112	569	683
					6	13	4628	2,77,680	3,33,216	462	555
	35x20	416	140	102	5	16	6656	3,99,360	4,79,232	570	684
					6	13	5408	3,24,480	3,89,376	463	556

**Space utilisation by TGT in different operations (8' column)**

Particulars	Transportation	Cold Storage	Preservation			Oviposition
			Upper	Bottom	Total	
No. of trays	47	47	16	16	16	47
Capacity/tray	30	30	30	42	72	42
Total no. of cocoons/sq. ft.	1410	1410	480	672	1152	1974

nylon ropes passed through grooves. A consignment of 10 trays occupies 51.5 x 32.60 x 33.50 cm space and weighs approximately 5 kg.

### Preservation

**Garland formation and hanging :** The peduncles of seed cocoons, in the existing practice, are tied in 25 bunches of four cocoons in twisted jute rope. The bunches are not allowed to overlap each other with an aim to provide space for emergence and

pairing. All the garlands are hung with the wire strings on the bamboo frame. The distance between grainage floor and lower end of garland is kept at 2 feet to facilitate the hygiene operations while the two rows would be at a distance of 1-2 feet to facilitate operational movements.

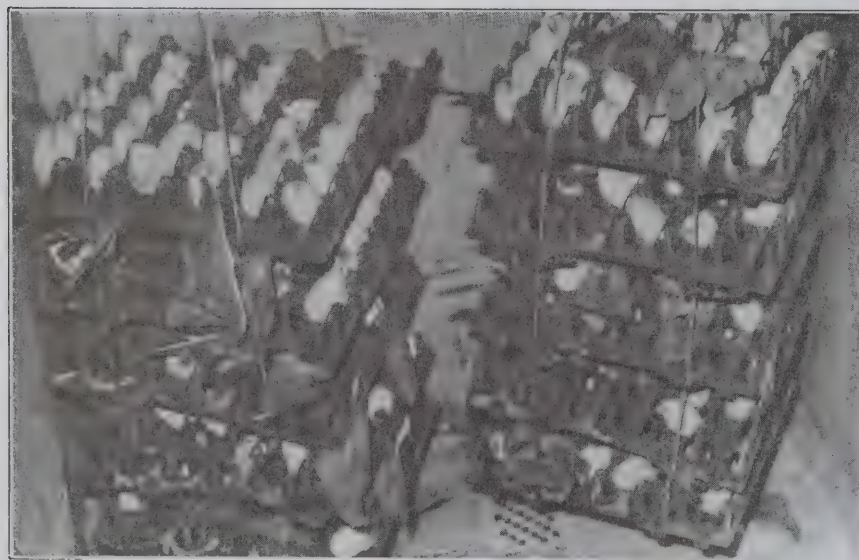
On the other hand, each TGT will accommodate 30 cocoons on ventral side while the anterior end of the cocoons faces upward direction with open space between two trays and posterior end into

the sockets. The cocoon lies between interconal quadrangular space. The adjacent walls of four inverted cones help to maintain the posture of cocoons (Fig. 1). In bottom plan tier another 42 cocoons can be accommodated. The distance between two trays is kept at 4" for smooth emergence of the moths, which can be altered suitably. The nylon ropes are inserted through grooves and rest in holes of placement component of tray and thus, "vertical column of 4', 5', 6', 7' or 8' of trays are prepared. The variability of each vertical column is adduced in Table 1 keeping in view the recommended grainage size of 30' x 20'.

The trays can also be affixed with iron stand having two and 3 pronged hooks. In each stand, hooks are at 5" distance (Fig. 2).

### Periodical screening

Today, preserved seed cocoons are screened periodically to ascertain the actual position of live seed cocoons. In large scale preservation, sorting of sample is restored with appropriate sample size by earmarking peripheral and centre



**Fig. 3. Moth emergence and mating in TGT**



placed garlands. Dead, emerged, diseased and rat cut cocoons are sorted from time to time. The operation of tying and untying of the cocoons and regarlanding is labour oriented and costly. Frequent sorting is uneconomical and not practical.

In TGT, the trays are placed in the hanged columns with sliding devices and moved upward by left hand to create 2" to 3" space and right hand is used for screening of cocoons by touch and feel method. The trays fixed on stands are tilted diagonally and sorting is done.

The operation is smooth, less cumbersome and economical. Sorting can be resorted to frequently, i.e. weekly, fortnightly or

monthly. Sorting and replacement with live cocoons is done simultaneously.

### Emergence moth and Mating

The very purpose of garland formation of cocoons in bunches in the existing practice is to provide optimum space for emergence of moth and vertical posture for stretching the wings and proper mating. The anterior end of cocoons gets softened by secretion of proteolytic enzyme by maxillary galae of fresh moth. It rather facilitates the moth to make hole for emergence.

Mating takes place after 2 to 3 hours of emergence preferably in dark, cool and humid conditions. The coupling continues for

10 to 12 hours. Natural coupling in grainage is preferred and optimised by creating suitable environmental conditions.

In TGT, the emergence initiates late in the evening and continues till dawn with its peak between 19.00 and 22.00 hours. Softening of the anterior end of the cocoons is the first sign.

The emerged moths have the tendency to migrate towards the periphery of the trays and stretching of wings takes place thereto. Here, the natural mating is also possible (Fig 3). However, coupling in nylon net is advisable as it enhances grainage efficiency. This is desired because TGT application increases preservation capacity per unit area and helps to

**Table 3. Unit cost of projections of tasar seed production through TGT application**

Sl. No.	Items of investment	Type of seed cocoons to be processed			
		BV		TV	
		Existing*	TGT**	Existing*	TGT**
<b>A.</b>	<b>Capital expenditure</b>				
1.	Grainage house	Rs. 400000	400000	400000	400000
2.	Grainage equipments	Rs. 60000	150000	60000	150000
	Capital expenditure apportioned for one operation				
1.	Grainage house	Rs. 11000	11000	11000	11000
2.	Grainage equipments	Rs. 2500	6250	2000	6250
<b>B.</b>	<b>Working capital requirement for one grainage operation</b>				
1.	Cost of seed cocoons	Rs. 90000	360000	75000	300000
2.	Cost of consumable articles	Rs. 3000	3000	3000	3000
3.	Wages	Rs. 10500	21000	10500	21000
	Total cost on the basis of apportioned capital expenditure per operation	Rs. 117000	401250	98170	341250
<b>C.</b>	<b>Less sale proceed of pierced cocoons</b>	Rs. 30000	120000	28000	112000
	Net expenditure	Rs. 87000	281250	70170	229250
	No. of dfls produced	Rs. 20000	80000	20000	80000
	Unit cost per dfl x	Rs.. 4.35	3.51	3.50	2.86
	TGT-Economic efficiency (%)	-	19.3	-	18.28
	TGT-Productive efficiency (%)	-	400.00	-	400.00

\* Against preservation capacity of 1 lakh, \*\* Against preservation capacity of 4 lakh, x Cost per dfl may vary  $\pm$  10%

overcome overcrowding while pairing.

### Mating under nylon net

Nylon net of 35' x 20' x 10' available for chawki silkworm rearing can be used and any additional expenditure can be avoided. It can be erected under shade to avoid direct sunlight. The unmated moths of both the sexes in appropriate proportion should be released to get better results.

### Oviposition and egg collection

*Pre-moth treatment* : After coupling, the moths are decoupled by hand. The wings of decoupled female moth are cut and abdomen is pressed with fingers to urinate before placement for oviposition.

The egg laying devices in practice, are cups made up of leaf, paper, earth, plastic boxes and trays. Earthen cups are more common in commercial grainages. It has many disadvantages such as, fragile in grainage operations and transportation; its porous nature is prone to pathogens or microbes; disinfection is not easy; handling and labour-cumbersome; hand requires additional floor space.

On the other hand, the bottom plan (dorsal surface) of the TGT is having 42 cones which are detachable and well perforated for aeration. The dewinged, decoupled female moth is kept inside the cone by placing its abdomen towards undetachable end. The moth secures vertical/diagonal posture by affixing its legs to lay eggs for 48 to 72 hours.

To check the migration if any, the TGT has fixed plastic sieved or wire mesh cover. After oviposition, the moth is subjected to microscopic examination. The eggs after examination are scrapped and mixed in plastic sieve cover tray which is also used as eggs drying

tray and has overcome the disadvantages of the existing practice.

### Microscopic examination

Presently, the detection of Pebrine for microscopic examination is conducted by making smear of mid gut in moth crushing sets of porcelin under practice since decades, but are not readily available.

But in TGT, the cones having perforations at the bottom provide suitable space for moth crushing with the help of plastic pastles.

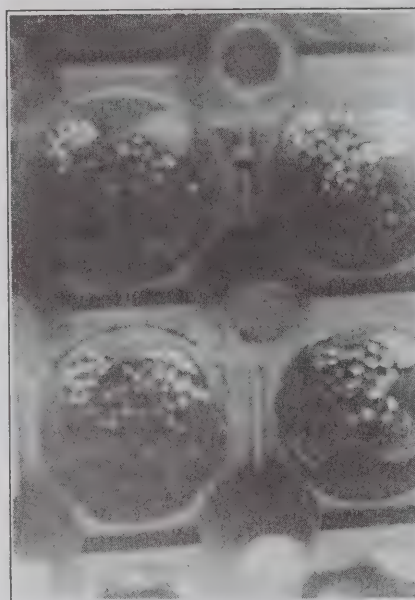


Fig. 4. Magnified view of egg laid in TGT

### Egg drying

In the existing practice, iron mesh tray and blotting papers are used. The disinfectant and water rinsed dfls are shade dried over blotting papers spread over iron mesh tray, floor or table top.

In TGT, the plastic sieved cover or wire mesh cover of 34.50 x 30.60 cm can accommodate 42 dfls. The added advantage is economising the utilisation of the space.

### Incubation of eggs

Presently, the eggs are incubated in perforated egg laying

boxes or muslin cloth bags. But, in TGT, the eggs can be incubated in cones. The dried eggs of 3 to 5 dfls can be placed in one cone and placed inside the egg carrying baskets in tiers for transportation.

### Grainage performance

An attempt was made to evaluate the performance of TGT for different parameters as against existing practices during 1997. The traits of emergence efficacy, emergence of crippled moths, moth mortality in oviposition, egg laying coefficients and pupal mortality were considered to ascertain its suitability. For the purpose, prototypes made from local material were introduced with suitable modifications.

No difference for emergence efficacy, emergence of crippled moth for both the sexes and egg laying coefficients, between TGT and existing grainage practices considered as control (Table 1). However, significant reduction was observed in pupal and moth mortality in oviposition.

### TGT and its economics

The economics of TGT and its variable capacity of bearing seed cocoons in a grainage are given in Table 2. The unit cost of a dfl comes to Rs. 4.35 and 3.50 for bivoltine (BV) and trivoltine (TV) grainage respectively (Ojha and Saxena, 1997). The TGT could minimise a dfl cost to an extent of Rs. 3.51 and Rs. 2.86 for BV and TV, respectively (Table 3). With the introduction of TGT the total modality has an economic efficiency of 19.3% in BV and 18.28% in TV, over prevailing system. In addition, the TGT could achieve productivity efficiency of 400% (Table 3) over traditional system of grainage.

**The author is with REC, CTRTI, Bilaspur, M.P.**



*A Legend:*

# Arjuna - More Than a Tasar Food Plant

K.B.G. Patro and Ashok Mohanty

**T**he name *Arjuna* reminds of the legendary hero of the great Indian epic *Mahabharata*, dextrous archer, third among *Pandavas* and friend-cum-disciple of Lord Krishna. But least is known about the glory of *Arjuna* tree in the connotation of the *Arjuna* of *Mahabharata*.

In sericulture, *arjuna* is better known as a large tree labelled *Terminalia arjuna* W&A - one of the primary food plants of tropical tasar silkworms, belonging to order Myrtales and family combretaceae. Scientific investigations are being carried out on *arjuna* in the interests of propagation and better realisation from tasar culture. But, least has been discussed about its medicinal importance.

*Arjuna* is a native tree of India, called as *Kauh* in Hindi, *Kukubhoh* and *Dhobdo* in Sanskrit, *Orjuna* in Oriya, *Mirichamachettu* in Telugu and *Aarjun* in Bangla.

## **The legend goes**

King *Pandu* of Hastinapur went to destroy demons. He was staying at *Satsruna* hills along with his wives, *Kunti* and *Madri*. At the foothills, near the bank of *Suro* river, amidst forest of *arjuna* trees *Kunti* gave birth to third of *Pandavs*. *Pandu* named him *arjuna* for the trees around.

And, as the other legend tells, saint *Sumantak* sat in deep meditation below an *arjuna* tree in the

dense woods of *asakand*. At the end of *tapasya*, he opened his eyes and wondered to find dry fruits all around. He as well quivered by the tears of the crying tree falling on him. The tree lamented about the bestowed by the Nature. Neither dry woody fruits are edible nor its flowers though beautiful are utilized for sacred purposes. It requested for salvation from such a meaningless life.

The saint consoled about the quality of fruit and flower as pre-ordained. "But"....he continued, "*Arjuna*, a famous personality of *Aryavarta* shall take birth under your shade. The name *Arjuna* would be familiar to one and all. Besides, the twin sons of *Kubera* (God of richness) shall take your form owing to a curse. Then you shall be blessed with the holy touch of child *Krishna*. Though your fruit is non-edible and flowers undesirable in worship, you will be famous for your magnificent medicinal qualities bounteously beneficial for the mankind. So don't weep and be calm." Then the saint left.

And, the auspicious time arrived- *Nala* and *Manigriba* - twins of god *Kubera* appeased Lord *Shiva* through *tapasya* and sought a boon for one hundred *apsara* (heavenly damsels). As blessed, they appeared in no time. While they were enjoying a bath with them and the mundane entertainment continued, *Devarshi Narad* was passing by that way to *badrika*

*ashram*. But, the twins cared him the least. *Narad* realised that though blessed with a holy body they have lost their conscience. Taking pity on their condition and to withhold their further downfall, *Narad* cursed them, "Both of you shall born in *Gop* as *arjuna* trees whose flowers are not sacred and fruits non-edible. Due to my curse the medicinal qualities shall remain hidden." The twins fell prostrate before *Narad* at once and begged excuse. The saint then consoled that after getting a touch of child *Krishna* after a century the effects of the curse will go away and the tree shall be highly regarded for its medicinal properties. When *Narad* vanished, the twins sprouted as two *arjuna* trees at *Gop*.

After about a century, the environment of *Gop* turned sweet with the childish pranks of baby *Krishna*. Day by day his pranks were getting intolerable for mother *Yashoda*. Once, frustrated mother tied *Krishna* to a roll in order to control him. *Krishna* rolled it and tried to cross between twin *arjun* trees. He pulled hard as the roll got entangled between the cursed creatures. At last, the trees gave away and thus *Nala* and *Manigriba* attained salvation.

The *arjuna* tree blessed by *Muni Narada*, turned out to be useful for the mankind and sacrificed every part of it for the cause. The details below reflect its medicinal importance:

- \* To get relief from sprains, paste prepared from crushing and grinding of *arjuna* bark with unboiled milk or *arjuna* bark with black pepper, may be applied on the affected part.
- \* Extract of *arjuna* bark after boiling in water may be taken twice daily, with powdered sugar candy for bile disorders.
- \* To cure diabetes (*Madhumeha*) and (*Prameha*), the above bark extract mixed with honey and the powder prepared from drying, crushing and grinding *arjuna* bark, may also be taken for the purpose.
- \* In a bone fracture, after proper

bandage and dressing, powder of *arjuna* bark may be taken with ghee and honey, for quick joining of the broken parts.

- \* Heart diseases can be cured by extract of the bark in cowmilk and water, cooled and then filtered.
- \* to get relief from congestion, bark of *arjuna* root may be boiled in goat milk and taken.
- \* To cure a wound, cow-ghee applied *arjuna* leaf is roasted and tied tightly over it.
- \* Paste prepared from grinding of *arjuna* leaf or flower with milk when applied to skin can destroy lice.

- \* Boiled bark extract when taken with sugar can subside action of poison.

Ayurvedic medicines prepared from *arjuna* tree are available in the market also. The medicinal properties described above give a fundamental idea. Therefore, it is advisable to take the preparations only after proper medical advice from a recognised ayurvedic physician.

*The authors are with E.S.S., Potangi, Koraput and Orissa Sericulture Technologists Association, Bhubaneswar, respectively.*

Courtesy: Sachitra Vijaya

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### **RESPONSES**

*Do you feel strongly about any aspect of sericulture in the country ? Please feel free to write to the Editor. Besides your reactions to the articles published in **Indian Silk**, we welcome your thoughts on any aspect related to sericulture.*



# Muga Culture in Coochbehar

**I**n the sericulture map of India, Coochbehar district of West Bengal stands unique since it is the only district outside the North-eastern region where muga culture is commercially exploited. This has been possible through the efforts of Central Silk Board and Research Extension Centre (REC), Coochbehar, which motivated the farmers to take up muga culture as one of their sources of livelihood.

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**Coochbehar in West Bengal is the only district outside North-eastern region where muga culture is commercially exploited. Extensive extension effort is on here to popularise the culture.**

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## Muga culture

Muga silkworm feeds primarily on food plants like Som (*Machilus bombycina*) and Soalu (*Litsaea polyantha*) etc. Apart from this, secondary food plants upon which muga silkworm can thrive are Dighloti (*Litsaea salicifolia*), Bagori (*Zizyphus jujuba*) etc. Soalu plants are abundantly found in the natural conditions of this region. Of these, Som is preferable to Soalu due to various technical reasons.

The silkworm i.e., *Antheraea assamensis* is a semi-domesticated insect which spends a major part of

its life-cycle on the host plant but comes down when it ripens and is ready for spinning. The matured worms are collected manually and transferred to a bunch of dried leaves of mango, jackfruit etc., called 'Jali' where it undergoes transformation into pupa and forms cocoons. The life-cycle of the insect is completed in 22-25 days depending on the season. The multivoltine muga silkworm completes 5-6 generations in a year.

## Practice of muga culture

At present, there are about 60 families in the district involved in muga culture. There are two commercial crops – Jethua (April/May) and Kotia (September/October) preceded by two seed crops – Late Jarua (March/April) and Late Bhodia (August/September), respectively.

At present, there are five seed rearers and 45 commercial rearers under REC, Coochbehar confined mostly to 15 villages of two districts. The total acreage under muga at present is about 43 acre out of which 30 acre of land alone was brought under the Augmentation of Muga Food Plant Project (AMFP) of CSB during the last two years. Under this scheme, one acre of high land of a farmer was selected for plantation of 1000 plants (Som seedlings) in 2 x 2m spacing. The seedlings were supplied free of cost to the farmers. Technical guidance was provided to the farmers and an incentive of Rs. 4600 (lumpsum) was given towards the cost of farmyard

manure and labour by the farmers for establishment of plantation. After one year, another Rs. 1050 was paid to each beneficiary towards maintenance cost of plantation. Depending upon the soil conditions, the plantations are expected to be fit for rearing after two to two-and-a half years period.

Regarding marketing, at present the cocoons are purchased either by Mahila Kalyan Resam Silpa Samabay Samity, Rajarhat, Coochbehar or Muga Raw Material Bank, Sibsagar, Assam, a unit under CSB.

## Extension activities

Other activities of REC, Coochbehar include distribution of muga dfls transfer of technology from laboratory to the farmers, conducting of farmers training, supervision of rearing, grainage for production of commercial dfls, arranging group discussions and Farmer's Day, raising and distribution of Som seedlings, etc.

A farmer who takes up muga can earn Rs. 8000-10000 per bigha of land, annually. The only constraint is the unpredictable weather conditions. Since the rearing is conducted outdoor, success of crop depends to a large extent on the meteorological conditions prevailing during the rearing period. Keeping this constraint in mind, research is being carried out to domesticate the silkworm.

---

**Report : Ramkumar Saha, Zakir Hossain and Bhim Pada Mandal, REC, Coochbehar, West Bengal.**

# Recent Trends and Developments in Silk Reeling

T.N. Sonwalkar

**S**ericulture is an age old industry in India and silk reeling has been very traditional/primitive until recently. All the four varieties of silk are produced in India.

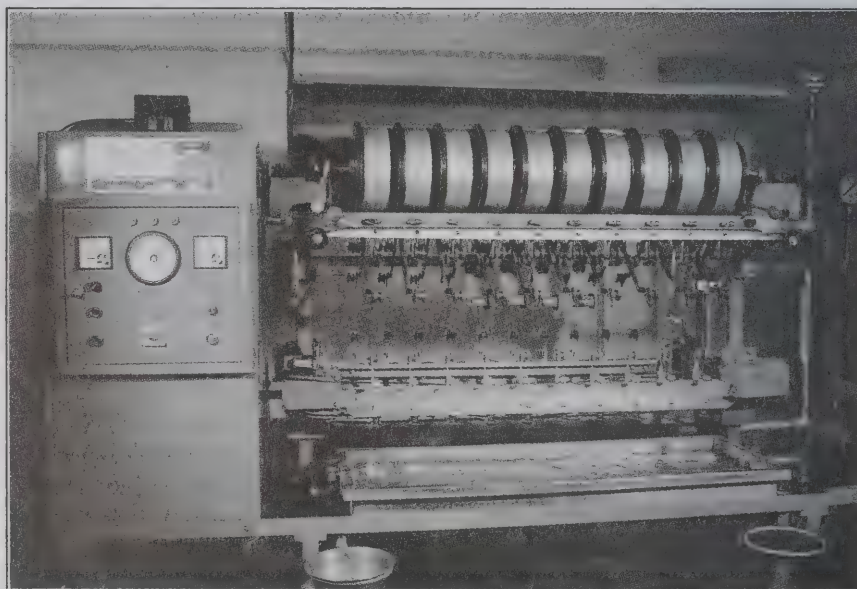
## Mulberry silk reeling

Even to date, 50% of raw silk is produced on country charaka.

***Though India is the second largest producer of silk in the world, bulk of its silk still comes from the traditional charaka.***

***The response for much needed technology upgradation is rather slow for various reasons including the high investment cost. The author stresses on the immediate need to adopt appropriate reeling technology that suit the quality for cocoons to derive the best.***

Of the remaining, about 40% silk is reeled on cottage basin and about 5% on improved multiend/automatic reeling. The remaining 5% is dupion silk. Quality of raw materials (cocoons) and investment



***Multiend reeling machine for better silk***

costs are the main reasons as to why charaka reeling is still popular in the country. Even though about 40% of cocoons (improved cross) is suitable for multiend reeling for producing quality raw silk, cottage basin reeling is still widely practised.

It has been established that raw silk reeled on cottage basin cannot fulfill all the quality characters of international grade whereas raw silk reeled on multiend machine (developed by the Central Silk Technological Research Institute (CSTRI), Bangalore, from improved multivoltine cocoons can stand to atleast international 'C' grade. Replacement of cottage basins with improved multiend machines is not in great urgency mostly on account of absence of demand for quality silk and high

investment cost. The investment cost of multiend machine is 2.5 times more than that of cottage basin for a production unit of the same capacity. But return of the investment will be within a year. Still the reelers, particularly in traditional states, are somewhat reluctant to switchover to multiend reeling. If the silk reeled on multiend machines is tested/graded and gets a remunerative price, reelers would certainly come forward to invest on these modern machines.

It has also been established that only two types of reeling devices in mulberry reeling sector are necessary under the present Indian conditions. Charaka system of reeling is necessary and suitable for inferior quality cocoons such as ordinary/cross multivoltine and



other inferior/defective cocoons for production of coarse (heavy denier) raw silk and also dupion silk.

Multiend reeling system is necessary and suitable for improved multivoltine and bivoltine cocoons to produce high grade quality raw silk. Earlier, projects for 4, 6 and 10 basins (multiend machines) together with few improved charakas were formulated depending upon the production capacity and availability of good cocoons in a particular region. Normally, a unit of 10 basins with 2 charakas is a standard reeling unit in traditional sericultural states such as Karnataka, Andhra Pradesh, Tamil Nadu and Jammu & Kashmir. Similar units of 4 basins and 6 basins with one or two charakas would be more suitable in West Bengal as well as new areas/states. Preferably boiler may be included at least for 10 basins unit and well ventilated building (shed) should be provided. There need not be cottage basins at all. About 25 years back when cottage basins were needed to produce better quality silk over charaka silk, cocoon quality (particularly in



*Takhli spinning of Eri*

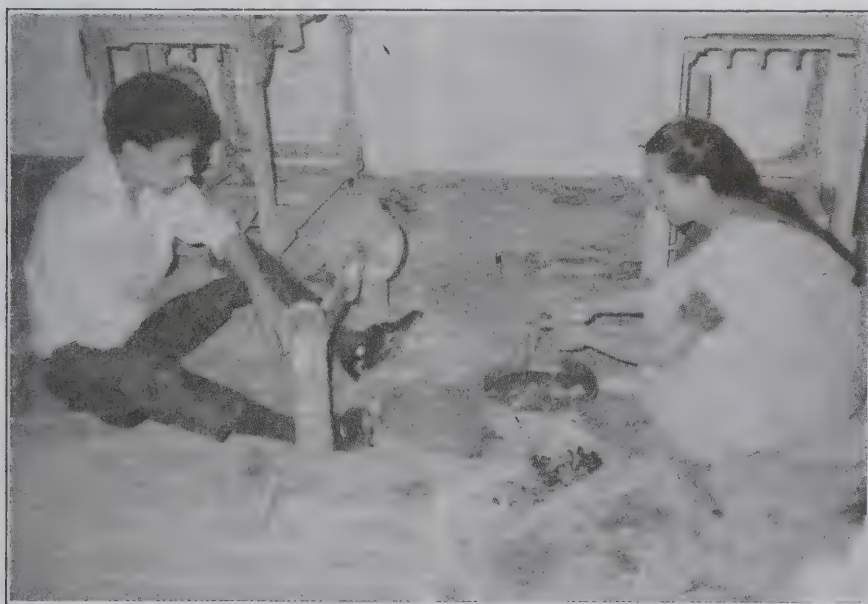
Karnataka) was not as good as of now. Filament length used to be hardly 350 mtr. Now-a-days, improved cross multivoltine cocoons yield about 600 mtr. filament, so a reeler can maintain 10 ends reeling on multiend machine with normal speed. However, present cottage basins, using these cocoons, run at a very high speed since reeler can cope with it, on account of longer filament. The high speed cottage basins though help to get more production, the

quality suffers, particularly size deviation, tenacity etc. Cottage basins are not equipped with necessary mechanisms such as jetteboute, tension device, individual reel stop mechanism and alignment to maintain the quality characters. Therefore, it is not advisable to reel improved cross multivoltine (PM X NB<sub>4</sub>D<sub>2</sub>, PM X NB<sub>7</sub> etc.) and bivoltine cocoons on cottage basins.

#### **Automatic silk reeling machine**

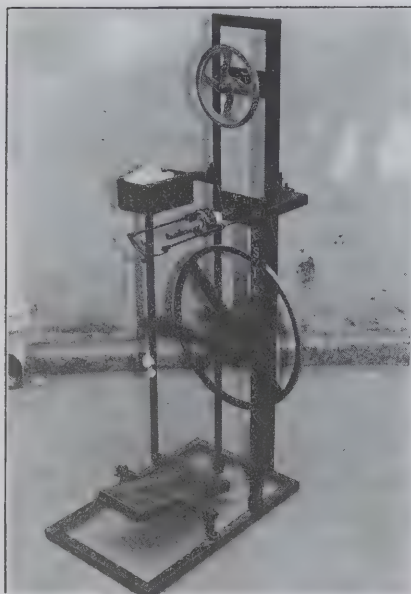
The main objective of this machine is to save labour. However, it requires very high quality bivoltine cocoons of about 1000 mtr. filament and uniformity in cocoon size, weight etc. as well as maintenance of very high order. Further, it has to be imported at exorbitant costs. So, considering all these factors, India need not go for automatic reeling, at present. Appropriate technology perhaps is the only option for India instead of following advanced technology practised in Japan or South Korea.

So systematic planning of multiend reeling units together with improved charakas should be made in all the states. Departments of sericulture and Central Silk Board



*Muga reeling on 'Bhir'*





**CSTRI pedal spinning wheel**

are giving incentives to reelers, both new as well as to cottage basin reelers, for replacement. Simultaneously, cocoon testing and raw silk testing should be made compulsory. Prices of cocoon and raw silk should be based on quality which would determine the minimum floor price of cocoon and raw silk.

Appropriate silk reeling technique should be followed for all the three varieties of cocoons available in India.

- \* *Multivoltine ordinary cocoons:* Pure Mysore X C.Nichi,/ Nistari etc. Cocoons should be steam-stifled, cooked by open pan method and reeled on improved charaka within about 10 days.
- \* *Multivoltine improved cross:* Pure Mysore X NB<sub>4</sub>D<sub>2</sub> etc. Cocoons should be steam stifled (chamber type), cooked with open pan or three pan and reeled on multiend machine within about 15 days.
- \* *Bivoltine cocoons:* Cocoons should be hot air dried, cooked with three pan or pressurized system and reeled on multiend machines.

In all the cases, cocoon sorting should be done to single out defective/inferior cocoons, before reeling.

### **Non-mulberry silk reeling**

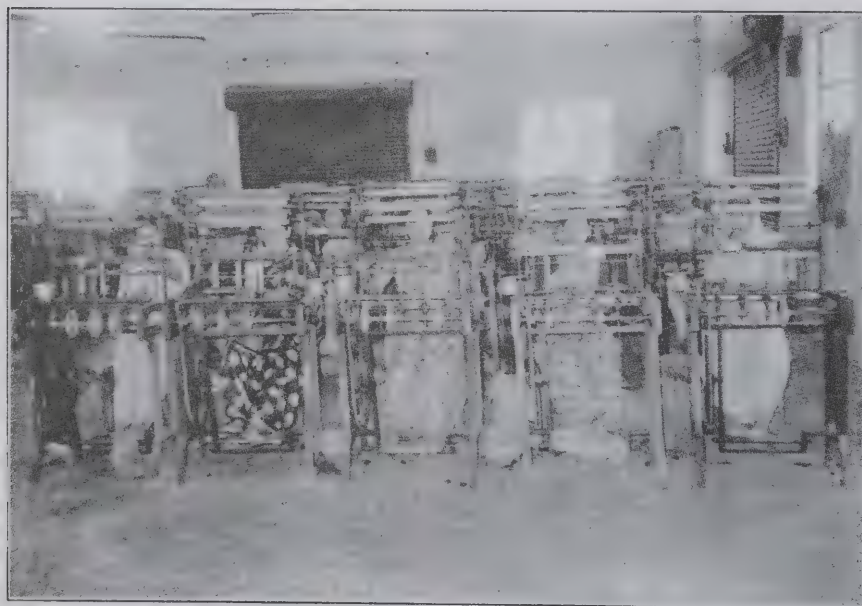
*Tasar :* As in the case of mulberry charaka reeling, *Natwa* (thigh) reeling is very common in tasar sector. This primitive one-end reeling device is of very low productivity (unlike in mulberry charaka) and labourious with health hazards. It also does not need high investment. The yarn reeled by *Natwa* system is compact as fila-

ments drawn from bunch of cocoons are rubbed on the thigh in wet condition. Sometimes starch is also applied.

Tasar cocoons are hard and reeling technique is cumbersome. The cocoons are to be cooked with some chemicals to soften their layers. Poor reelability and more cocoon dropping during reeling results in low productivity and reeling efficiency. A reeler may hardly maintain 4 ends reeling. There are Tasar pedal reeling devices which have twisting facility. But, the twist rate during reeling is very low with about 5 twists per inch. Production on pedal reeling devices is about 2.5 times than that of *Natwa* system. But, it does not yield a compact yarn. For warp, the yarn needs twisting. However, pedal reeling should be popularised since production rate is high and also helps avoiding health hazards. Simultaneously, twisting (as in the of mulberry sector) needs to be encouraged. Four spindle tasar pedal reeling machine developed by the Central Tasar Research and Training Institute (CTRTI), Ranchi should be popularised.

During cooking, quite a good number of cocoons are burst open on account of peduncle. Along with pierced cocoons they are used for production of Ghicha yarn. In fact, it is estimated that production of Ghicha yarn is more than the reeled tasar yarn. Ghicha yarn preparation is comparatively easier and may be compared with the dupion yarn. It has good demand in weaving sector. However, the unreelable tasar cocoons can also be hand spun more economically on pedal spinning charakas and its quality would be certainly better.

Tasar cocoons should be hot air dried for long storage, cooked with pressurized system (steaming



**CSTRI four spindle tasar reeling machines**



the cocoons above alkaline medium) and reeled on pedal reeling machines. Reeled yarn should be twisted for warp purpose.

**Muga:** 'Bhir' is a primitive but popular muga cocoon reeling device in Assam. In principle, this reeling process is comparable to *Natwa* reeling. Here, a bundle of filaments is rubbed on fore arm to make the yarn compact. Two persons hardly produce 80 to 100 gm raw silk per day, maintaining one end reeling. Muga cocoons are sundried and stored. The cocoons are cooked in slight alkaline medium for few minutes and reeled on 'Bhir' in hot water as in the case of mulberry reeling. Muga cocoons are not as hard as tasar cocoons, so cooking and reeling is comparatively easier. However, reelability of muga cocoons is poor, so a reeler can maintain hardly 4 ends. There are pedal reeling machines for muga cocoons. Muga cocoons can also be reeled on modified 4 end cottage basin without twist to attain higher production. In fact, tasar reeling machines can be used for muga reeling. As in the case of *Natwa* tasar yarn, weavers prefer Bhir yarn on account of compactness, but its productivity is low. So, pedal reeling with 4 ends and 4 end cottage basins should be popularised, together with twisting facility at

least for warp yarn. Waste is more in muga reeling which should be effectively utilised for hand spinning on pedal wheels or on Amber charaka.

Muga cocoons should be hot air dried, cooked with slight alkaline medium and reeled on pedal reeling or cottage basin machines. Twisting should be popularised.

**Eri:** Most of the eri cocoons are degummed and hand spun on 'Takli' in Assam. Generally, eri hand spun yarn is of 10<sup>s</sup> and 20<sup>s</sup> English count. The production of yarn on 'Takli' is low. Pedal wheels should be popularised for eri cocoon spinning since, its productivity is more.

All the waste cocoons (mulberry or non-mulberry) should be effectively utilised for hand spinning on pedal wheels, whereas reeling waste should be utilised for spinning on Amber charaka. Concerned government and non-governmental organisations should arrange for training of villagers. Trained enterprisers may be provided with pedal wheels with subsidy. Waste cocoons should be issued to the spinners and yarn should be collected by DOS/CSB/NGOs. Spinners should be paid suitable remuneration on the basis of unit weight or length of yarn.

**The author is former Director of CSTRI, Bangalore.**

## Catalogue Show at Addis Ababa

The Embassy of India in Ethiopia is planning to organise a catalogue show of Indian products in Addis Ababa during July, 1998. The show second in order (first was in March, 1998) is expected to generate considerable interest among Ethiopian business community in India's manufacturing and export capabilities. Interested parties may send their brochures/catalogues

of their products to the Embassy for the show.

For further details, contact:

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## Announcement

### Mulberry Silkworm Race Authorisation

The Central Silk Board has introduced a Race Authorisation System during 1995 under CSB Act 1948 Section 8(1) to promote development of the silk industry by selecting high yielders for commercial exploitation and successfully tested two batches. The third batch is currently under testing.

As per the Race Authorisation System, mulberry silkworm hybrids either evolved or procured by Individuals, Research Institutes, Universities under Central/State or any other agency involved in mulberry silkworm breeding activity shall, before release for commercial rearing or for their multiplication, have to be authorised by the Authorisation Committee of Central Silk Board.

Breeders intending to get their mulberry silkworm hybrids authorised are requested to obtain the application forms from Member Secretary, Central Silk Board, Ministry of Textiles, Govt. of India, CSB Complex, BTM Layout, Madivala, Bangalore-560 068 and submit the same in the prescribed formats. The committee will meet twice a year in September and March and consider all applications received before 31st August 1998 and 28th February 1999, respectively.

Sd/-

**[Arun Ramanathan]**  
Member Secretary

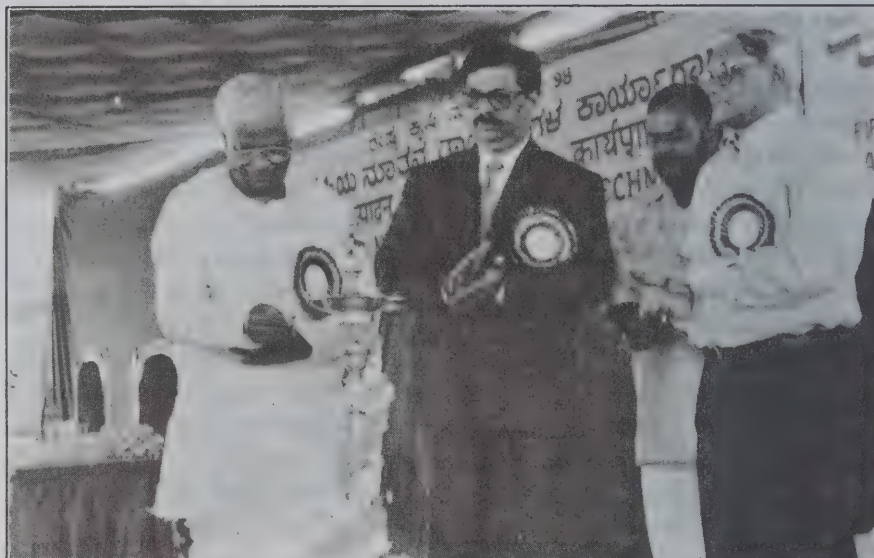
## Reshame Krishi Mela -1998 at CSRTI, Mysore

A two -day Reshme Krishi Mela - 1998 was organised by the Central Sericultural Research & Training Institute, Mysore on 27th and 28th February, 1998 to commemorate Golden Jubilee Year of India's Independence. On the occasion, farm demonstrations were organised depicting various technical aspects of the new technologies developed, by the institute towards increasing the silk production.

Inaugurating the Shri H. Ekanthaiah, Chairman, Central Silk Board, said that sericulture is becoming popular due to its low investment and high yielding features. More than 60 lakh families are depending on sericulture and silk industry in the country and by rejuvenating the industry it would be possible to achieve the production target of 20,000 MT by the turn of the century. Referring to increase in competition following globalisation policy, he stressed the need for improvement in the level of productivity and quality of silk which continued to be low despite substantial increase in the production. He called upon the scientists and farming community to bridge the gap between domestic demand and supply by adopting new techniques and utilizing new high yielding mulberry varieties and silkworm races developed by CSRTI, Mysore.

He also called upon sericulture scientists to concentrate more on quality aspect besides the quantity. To bring in quality consciousness in the production of raw silk in India, farmers need to be imparted with technical knowledge and training, he emphasised.

The chief guest of the



**Shri H. Ekanthaiah, Chairman, CSB inaugurating the Mela. Also seen are Prof. S.N. Hegde, Vice-chancellor, University of Mysore, Shri Mariswamy Gowda, Member, CSB and Dr. R.K. Datta, Director, CSRTI, Mysore**

occasion, Prof. S.N. Hegde also stressed on the training the farmers. Due to lack of professional training, the abundant resources of the country such as man power, land flora and fauna have not been exploited properly.

He further said that such organisations will certainly bring a strong belief in the farmers about the adoption of the technologies, necessary for effective and remunerative farming. It will also help them in learning new scientific practices aimed at promoting silk production in the country, he said.

Dr. R.K. Datta, Director, CSRTI, Mysore in his presidential address outlined the research activities and achievements institute of CSRTI during the last 30 years. He reiterated the impact of the package of practices for mulberry cultivation and new technologies for silkworm rearing introduced by the institute. He briefed about the high yielding silkworm breeds, improved methods of mulberry

cultivation and disinfection/disease control. By using new method of disinfection and bed disinfectants like Vijetha, raising mulberry with new agronomic package and high yielding mulberry varieties such as V<sub>1</sub>, silk production has been increased remarkably, he added.

Shri H. Ekanthaiah, released a souvenir brought out by the Institute to mark the occasion. A technical booklet in Kannada depicting new technologies in sericulture developed by the institute was also released. More than 500 sericulturists from different parts of the state besides officials and scientists from the Department of Sericulture, Karnataka attended the programme.

As a part of the Mela, group discussions on Moriculture, Sericulture, Hygiene, Diseases and Pest Management were also conducted in which farmers actively took part and interacted with the scientists.

**Report: B.S. Pappu and A.K. Ganguly, CSRTI, Mysore.**



## Member Secretary Visits Unnao



**Shri Arun Ramanathan, IAS, Member Secretary, Central Silk Board**  
*discussing with the officials*

Shri Arun Ramanathan, IAS, Member Secretary, Central Silk Board, Bangalore visited the operational areas of Research Extension Centre, Unnao on 28.2.98. At Fatehpur Chaurasi, the main

operational area of the centre he visited many private mulberry gardens, established during 1988-89, and met the pioneer sericulturist at village Baburiha. He discussed at length about their rearing

capacity, available rearing appliances, proportionate area under mulberry cultivation, cocoon production, returns and problems related to marketing.

During his visit to the field he made number of suggestions for overall improvement of the industry in the district and emphasised the need to transfer only the economic and viable technologies to the field by Research Extension Centre. He assured the farmers to look into the marketing aspect as well as the cost of the cocoons.

Kum. Meera Verma, Asst. Director, briefed the Member-Secretary about the activities of the Centre and its impact on the overall development of the sericulture in the district. Dr. S.M.H. Qadiri, Joint Director, ZSSPO, Lucknow was also present during the visit.

**Report: Kum. Meera Verma,**  
**Asst. Director, Research Extension Centre, Unnao.**

## Seminar on Silkworm Seed Production

A one-day Current Technology Seminar on Silkworm Seed Production was organised at Silkworm Seed Technology Laboratory (SSTL), Kodathi, Bangalore on February 10, 1998. The event was held to commemorate the golden jubilee celebration of independence with a view to create a forum for the scientists to familiarise, explore and interact on research and developmental activities in sericultural sciences.

Dr. M.V. Samson, Director highlighted the activities of SSTL and gave a brief account of the technologies developed. Dr. R. Dwarakinath, eminent scientist and former Vice-chancellor, UAS, Bangalore stressed the attributes of success of "Green Revolution" which resulted in self-sufficiency of food production in the country.

While comparing agriculture and sericulture, he pointed out the importance of sericulture with other farm enterprises stating that it is not only cost-effective, but also within the reach of the farmers yielding better returns in a short span of time. He felt the relevance of popularizing bivoltine technology. Citing a few examples, Dr. Dwarakinath emphasised the importance of strengthening the extension network to disseminate the research findings from lab to land and also proposed that yield survey should be undertaken in sericulture.

Dr. T. Pavan Kumar, Director, National Silkworm Seed Project, Bangalore stated that growth in sericulture industry was faster upto 1990 and now it has reached a phase of stagnation. He felt that

in order to tackle the problems of seed production and management regionally, an in-depth discussion involving DOS, LSPs and Central Silk Board is necessary.

Dr. K. Thangavelu, Director, SMGS, Hosur stressed the need to improve the seed production techniques. He also felt the need for strengthening the extension for an effective and quick transmission of technologies to farmers.

There were two scientific sessions on (1) Seed Crop Rearing & Commercial Seed Production and (2) Silkworm diseases and Pest Management. The papers (20) presented in both the sessions dealt with seed production in different regions, seed crop relating to mulberry and rearing management, silkworm seed production and preservation technology



as well as challenges to bivoltine sericulture and also to the rate of multiplication of *Nosema bombycis* spores for the detection of pebrine disease and eco-friendly approach for pest management.

The recommendations of the seminar include adoption of MR<sub>2</sub> mulberry variety during summer for seed crop followed by K<sub>2</sub> and S<sub>36</sub>; maintenance of ideal temperature (25 C) and relative humidity (75%) for pupal preser-

vation; preserving the moths at higher temperature for easy detection of pebrine spores and use of HDPE bags with LDPE lining, black casement and black LDPE sheet bags to control dermestid beetle, constitution of joint monitoring committee to oversee disease incidence in BSF, seed area and grainages in J & K, as there is no demarcated area in the state

**Report: Director, SSTL, Kodathi, Bangalore.**

## Special field Day at K.R. Nagar

To commemorate the 50th year of Independence, a special field day function was organised by the Silkworm Seed Production Centre, K.R. Nagar on 26.2.98 at Lalandevanahally (K.R. Nagar Taluk) and about 200 sericulturists participated in the function.

Inaugurating the field day, Dr. T.Pavan Kumar, Director, NSSP, Bangalore expressed serious concern about the smaller land holdings under mulberry (0.25 to 0.5 acres) amidst paddy fields and low consumption of dfls/annum (200-400 dfls). He suggested for improvement of mulberry garden for more productivity and also to make use of insurance coverage if the crop fails at later stages.

Welcoming the interest shown by the farmers for shoot rearing, he agreed to arrange a study tour for 50 farmers to Kolar. He suggested the farmers to go for step up & step down method of pruning on trial basis to maintain mulberry garden and obtain uniform leaf yield for equal amount of consumption in all the crops.

Pointing out at the low price fetched for reeling cocoons in Kollegal market, he suggested that farmers are at liberty to take their produce to any market in Karnataka to fetch higher rates. To find out the reelability of silk produced in this area, he suggested the Asst. Director, SSPC to collect sample cocoons from farmers and to send them to CSTRI, Bangalore to get examined for the quality and reelability.

He also suggested to go for foliar spray besides application of recommended dose of FYM and chemical fertilizers to ensure quality leaf and for more consumption of dfls. He assured supply of quality seeds to farmers in the area.

## Tasar Kissan Mela



**Dr. M.A.Mohsin, Vice-Chancellor, Birsa Agricultural University going around the exhibition**

A one-day "Kissan Mela" on tasar and lac cultivation was jointly organised by Central Tasar Research & Training Institute (CTR&TI), and Indian Lac Research Institute (ILRI) at Ranchi on January 17, 1998.

The Mela was inaugurated by Dr. M.A.Mohsin, Vice-Chancellor, Birsa Agricultural University, Kanke, Ranchi. He stressed the role of tasar and lac culture in the economic uplift of the tribals. He appealed to them to avail of the expertise and guidance of CTR&TI and ILRI in this regard. Dr. K.K.Kumar, Director (I/c), ILRI

spoke about the objectives of the programme.

Smt. Roseline Lakra, Director, All India Radio who was the Chief Guest called upon the farmers to take advantage of the radio programmes on the subject.

An exhibition was also organised under the aegis of CTR&TI, ILRI, Central Horticulture Experiment Station, IFFCO, KRIBHCO and Krishi Vigyan Kendra to popularize the theme. Besides, a Krishi Gosthi was also arranged.

**Report: A.H.Naqvi, CTR&TI, Nagri, Ranchi, Bihar.**





**Shri Anke Gowda, progressive sericulturist interacting with scientists**

Shri Jayant Jayaswal, Joint Director, ZSSPO, Bangalore in his presidential address stressed to ensure good fertility status of mulberry garden and proper disinfection of rearing house and appliances, to keep the rearing hygiene as these two are the main factors in getting a good harvest.

Dr. Mugdam, Deputy Director and Shri B.Nagaraju, Asst. Director at SCPC, K.R.Pet and Dr. Chandrashekar, SRO, CSR&TI, Mysore gave useful tips to the farmers regarding several sericultural aspects.

**Report: Chikkanna, Asst. Director, SSPC, K.R. Nagar.**

## Reshme Krishi Vichara Gosthi

Silkworm Seed Production Centre, (SSPC) National Silkworm Seed Project, Central Silk Board Ramanagaram conducted a "Reshme Krishi Vichara Gosthi" at Chikkamuduvadi village in Kanakapura Taluk of Bangalore Rural District on February 5, 1998 as a part of the Golden Jubilee Celebrations of Indian Independence.

Dr. T.Pavan Kumar, Director, NSSP gave a detailed account of sericulture industry during pre-and post-independence period and stressed the need for quality and quantity on par with other developed sericultural countries.

Shri Jayant Jayaswal, Joint Director, ZSSPO (South), NSSP, Bangalore highlighted various developmental schemes envisaged in the 9th plan. Shri Sannappa, Deputy Director, Govt. Model Grainage, Channapatna and Smt. Renukadevi, Sericulture Extension Officer, Technical Service Centre Kanakapura also spoke on various subsidiary schemes. Dr. M. Baig,



**Dr. M. Baig, Deputy Director, NSSP, Bangalore speaking on the occasion**

Deputy Director, NSSP, Bangalore talked on diseases control and importance of rigid hygiene.

Shri Y.V.Ramanjaneyulu, Asst. Director, SSPC, Ramanagaram described the programme as an introspection of sericulture development during pre-and-post independence. Shri Puttaswamy

Gowda, a progressive sericulturist also participated in the programme. An exhibition also formed part of the event.

**Report : Y.V. Ramanjaneyulu, Asst. Director and A.Krishnappa, SRA, SSPC, Ramanagaram.**

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## Sericultural Exhibition at Mahakumbha Mela



*Sericulturists evincing interest in the exhibition*

Research Extension Centre, Mugur under Regional Sericultural Research Station, Chamarajanagar

organised a sericultural exhibition at T.Narasipura on 12th February, 1998 during the "Mahakumbha

Mela" in co-ordination with Grainage Extension Centre and Sub-unit, Kinakanahalli. The exhibition covered various new technologies such as, use of biofertilizer and vipul for mulberry productivity, dual inoculation of VAM and biofertilizer, IPM against uzi fly, disinfection and hygiene maintenance, silkworm disease and their control measures like Vijetha and new varieties of mulberry viz., S<sub>34</sub>, S<sub>13</sub>, S<sub>36</sub> and V<sub>1</sub>. The live demonstrations of disinfection with bleaching powder and uzifly control was also arranged on the occasion. Nearly 150 sericulturists of the taluk and nearby villages visited the exhibition and evinced keen interest in the technologies displayed.

**Report : Senior Technical Assistant, REC, Mugur and V.Thiagarajan, Joint Director, RSRS, Chamarajanagar.**

## Field Day

In commemoration of the 50th year of Independence, a Field Day was organised by Research Extension Centre (REC), Krishnagiri on February 19, 1998 at Tamil Nadu Iyampallam village to popularize the CSR hybrid races among the farmers. It coincided with the successful crop harvest of Shri Murugesan, a progressive farmer. The latest sericultural technologies were demonstrated.

Shri Ramamoorthy, Asst. Director, DOS, Krishnagiri, Govt. of Tamil Nadu apprised the participants about the advantages of sericulture for a small farmer. Shri Hiriyantha, SRO, REC, Krishnagiri emphasized the importance of planting new mulberry varieties such as S<sub>13</sub>, S<sub>36</sub> and V<sub>1</sub> because



*Field day in progress*

of their increased leaf productivity and the advantages of taking up bivoltine rearing.

Shri Murugesan narrated his experience of CSR hybrid rearing

which got him a very good return.

**Report: Hiriyantha, Senior Research Officer, REC, Krishnagiri.**

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# *The Silkworm Biology, Genetics and Breeding*

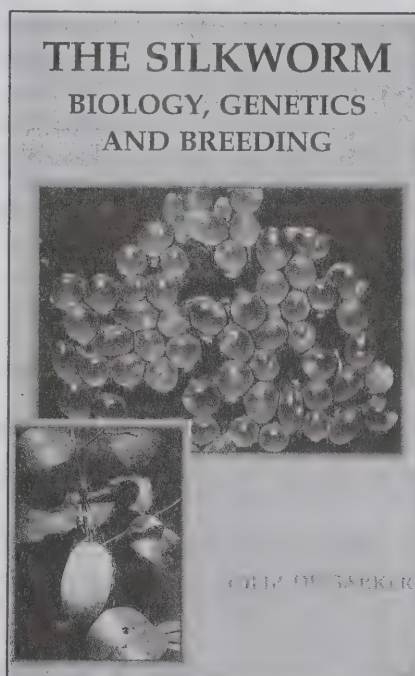
**T**he main aim of the author of science is primarily to make clear, what is happening in scientific thinking and it should be worth the time of most scientists to read him besides his targeted readers, college students, in this case. Dr. Dilip De Sarker has almost succeeded in such an endeavour.

Knowledge, particularly the scientific one is cumulative in nature. The present is built on the past and future on the present. Unlike in the case of pure genetics and breeding our knowledge of silkworm genetics and breeding, though expanded enormously in the last 2-3 decades, has not been compiled and documented in the form of books and literature- atleast to the extent done in the earlier case. This book, tries to make up the lacuna by making this information available on every known branch of the subject.

The volume while giving prominence to the developments in the last few years or so, the classical concepts from which the contemporary have sprung are not neglected. But the unwary lay reader is in for some surprises if he is not careful in his follow up since a good number of books and other related literature on sericulture have already made their presence felt strongly not only in China, Japan and Russia but also in India, as against the claim that there is a complete derth of books in sericulture. However, the statement may be justifiable to some extent if the reference is about the text books on sericulture.

The book is mainly divided into four parts. Part I covers, *Foundations of Genetics Cytogenet-*

*ics*, Part II covers, *Biology, Genetics and Breeding of Silkworm*, Part III covers, *Biology, Genetics and Breeding of Mulberry* and Part IV covers, *Research and Development in Sericulture*.



The content and achievement of both classical and contemporary work painted in broad outline-the book is suitable-not only for a vocational college student as author puts it-but also for a general reader, who is prepared to do a bit of hard thinking or the sixth former, who is in need of a glimpse of the woods after too much looking at the tree. The author does not see the volume as an end in itself. And, it seems he cherishes the hope that his efforts may awaken an honest hunger for more nourishing intellectual fare.

In an age of enforced specialization the reader would draw benefit from this book. It is as up-to-date as any book of this kind can

be-the text having thoroughly revised and few new chapters added. However the book does not have the consistency throughout. The flow of writing suddenly gets a mild jolt when a paper here on *silkworm breeding in India* and a paper there on *silkworm and mulberry germplasm station* appear with the original flavour and authorship of course. Sometimes it confuses the reader as to whether it is a compilation work. Though the title of the book is "The Silkworm Biology, Genetics and Breeding" it also deals with biology, genetics and breeding of mulberry besides other general topics, making the title to bleed out of its limitation. One of the striking features of the publication is its inexhaustible information gathering. The authors efforts towards this is highly appreciable. It has a resoursfulness which marks the writing. He analyses the meaning and limitations of the various views also.

The illustrations are of maximum value to the student and present the necessary scientific facts with artistry on good quality paper.

The publication with the authenticity of the subject behind it fulfills the demand of vocational students of sericulture, to a considerable extent.

This 338 page royal size book with good printing and useful references is published by Vikas Publishing House Pvt. Ltd., 576 Masjid Road, Jangpura, New Delhi-110 014. Price is Rs. 150.

**Mukund V. Kirsur, Indian Silk.**

# Textile Trade Fairs – 1998

<i>Date</i>	<i>Exhibition</i>	<i>Place</i>
	<b>OVERSEAS</b>	
1998 May 14-16	<b>SOFT FURNISHING ASIA '98</b> Textile and Furnishing for the Home, Office, Hospital Industries and Retail Venue : SICEC Contact : Singapore International Convention and Exhibition Centre Ph : 4312295/97 Fax : 65-4312268 Email : sales@ sicec.com Website : www.sicec.com	Singapore
30-02	<b>INTERNATIONAL FASHION BOUTIQUE</b> Womens Apparel, Accessories and Jewellery Immediate – Fall Venue : Javit Convention Centre Contact : The Larkin Group, New York NY 10018 Ph : 5940880 Fax: 1-212-5948556	New York U.S.A
Jun 03-05	<b>EXPOFIL</b> Yarns Contact : Expofil Ph : 48206364 Fax: 33-1-48203566	Paris France
03-05	<b>MODA PRIMA</b> Clothing and Knitwear Contact : SVIP Ph : 89010020 Fax: 39-2-89010345	Milano Italy
04-07	<b>FAST</b> Yarns, Accessories, Services and Technology for the Hosiery Industry Contact : Moda Consult srl Viale Sarca, 222-20126, Milano Ph : 66103391 Fax: 39-2-66103670	Verona Italy
Jul 03-06	<b>SEHM</b> Menswear, Leather Garments, Accessories Venue : Porte de Versailles Contact : Promosalons, New Delhi 110001 Ph : 3317054 Fax: 091-011-3722660	Paris France

<i>Date</i>	<i>Exhibition</i>	<i>Place</i>
15-18	<b>HONG KONG FASHION WEEK</b> Fabrics, Ready-to-wear, Accessories Venue : Hong Kong Convention and Exhibition Centre Contact : Hong Kong Trade Development Council Wanchai Ph : 25844333 Fax: 852-28240249	Hong Kong
15-18	<b>EUROPE SELECTION</b> Womens, Mens, Kidswear, Body-to-beach-wear Contact : Europe Selection S.r.l./ Hong Kong Ph : 28029902	Hong Kong
24-26	<b>HERREN MODE – WOCHE/ INTER – JEANS</b> Casualwear and Young Fashionwear Contact : Indo-German Chamber of Commerce, Mumbai Ph : 2186131 Fax : 91-22-2180523	Colonge Germany
Aug 02-04	<b>INTERNATIONAL KIDS FASHION</b> Childrenwear, Apparel, Accessories Footwear and Juvenile Products Immediate – Holiday – Early Spring Venue : Javit Convention Centre Contact : The Larkin group New York NY 10018 Ph : 5940880 Fax : 1-212-5948556	New York U.S.A.
02-05	<b>COLLECTION PREMIEREN DUSSLEDORF (CPD)</b> Ladieswear, Casualwear, Knitwear Accessories Venue : Messeglande Contact : Indo-German Chamber of Commerce, Mumbai Ph : 2186131 Fax : 091-022-2180523	Dusseldorf Germany



# Trade Enquiries

Sl. No.	Importers	Interested in
1.	Mr. K.J. Seo Woosung Textile Co. 64-91, Jangwi dong Sungbuk gu, Seoul Tel : 822-942-8321~7 Fax : 822-942-1280	Garments
2.	Mr. J.H. Kim, President Taesung Machinery Co. 781-7, Suksanri, Dongmyeon Yangsan, shi, Kyungnam Tel : 82523-386-0981 Fax : 82523-385-9206	Textile
3.	Mr. K.W. Chang Moon Star Int'l Inc #1308, KFPA Bldg. 35-4, Yoido dong Youngd-eungpo qu, Seoul Tel : 822-780-5783 Fax : 822-784-5784	Textile related Machinery
4.	Mr. Khalid M. Saleh Ms. Hashim & Saudi Co. PO Box: 240731, Amman 11124 Jordan Tel : 00-962-6-618406 Fax : 00-962-6-618403	Textile and Suiting
5.	Mr. Derar Mohammad Issa Subieh M/s. Al-Bayan R.M.G. Factories Amman, Jordan Tel : 00-962-6-4023382 Fax : 00-962-6-4023924	Readymade Garments
6.	Ms. Lina Odeh Amman, Jordan Tel : 00-962-6-685730 Fax : 00-962-6-685730	Textiles (clothes, garments, etc.)
7.	M/s. Alpha Import, Export & General Merchandise P.O. Box 1425 Tel : 322006 Fax : 363376	Textiles & Garments
8.	Hop Lanka Distributors High Level Road Watareka, Padukka, Sri Lanka Tel : 859123 Fax : 859123	Readymade Garments
9.	Mr. Dexter Allen C/o Arcent, Doha Tel : 605467 Fax : 605292	Fashion Garments

# तसर कीटपालन की एकीकृत तकनीक

एस.के. माथुर, वी.के. वर्मा, बी.एम.के. सिंह, ए.के. सिन्हा एवं बी.आर.पी. सिन्हा

**त**सर कीटपालन की परंपरागत विधि से पीड़कों व प्राकृतिक आपदाओं से द्वितीय अवस्था तक 30-35% तक नुकसान होता है। इससे बचने के लिए शिशु कीटपालन हेतु कई कीटपालन विधियाँ विकसित की गईं। गृह कीटपालन तकनीक के अधीन बोटल, घड़ा, टोकरी, बक्सा एवं ट्रे में जबकि बाह्य कीटपालन तकनीक में गड़ढ़े एवं चाकी बागान में नायलोन की जाली के अन्दर कीटपालन किया जाता है।

**परम्परा से तसर रेशमकीटों का पालन खुले में किया जाता रहा है। किन्तु इससे होनेवाले नुकसान के मद्देनजर समय-समय पर कीटपालन की अनेक विधियाँ अनुशंसित की गईं। प्रस्तुत तकनीक में चाकी व उत्तरावस्था की विभिन्न अपेक्षाओं व लाभों का समावेश किया गया है।**

उपरोक्त विधियों द्वारा शिशु कीटों का 72 घंटों तक कमरों के अन्दर और बाद में पौधों (अर्जुन व असन) पर बाह्य कीटपालन किया जाता है। इसमें बहुत कम मात्रा में ही शिशु कीटपालन किया जा सकता था। बड़े स्तर पर बाह्य परिस्थितियों में शिशु कीटपालन हेतु चाकी बागान में नाइलोन की जाली के अन्दर द्वितीय अवस्था तक के कीटपालन की विधि विकसित की गई है।

इन विधियों की अपनी सीमाएं होने के कारण हाल ही में केन्द्रीय तसर अनुसंधान एवं प्रशिक्षण संस्थान, राँची के शोध परिणामों के आधार पर तसर कीटपालन हेतु एकीकृत तकनीक का एक पैकेज विकसित किया गया है जिससे उत्तम कोसे के उत्पादन में लगभग 25% की वृद्धि की जा सकती है। इस पैकेज के मूल बिन्दु निम्नलिखित हैं :

## तसर रेशम कीटपालन कार्यक्रम

बेहतर कोसा उत्पादन हेतु उपयुक्त समय पर कीटपालन अत्यन्त आवश्यक है। कीटपालन के आरंभ में ब्रशिंग (नव स्फुटित कीटों को खाद्य पौधों पर चढ़ाना) निम्नलिखित कार्यक्रम

के अनुसार करना चाहिए :

फसल	त्रिप्रज प्रजाति	द्विप्रज प्रजाति
प्रथम फसल	जून के तृतीय सप्ताह में	जुलाई के प्रथम अथवा द्वितीय सप्ताह में
द्वितीय फसल	अगस्त के चतुर्थ सप्ताह में	सितम्बर के द्वितीय अथवा तृतीय सप्ताह में
तृतीय फसल	नवम्बर के प्रथम सप्ताह में	

उपरोक्त कार्यक्रम में भौगोलिक एवं आंचलिक अवस्थाओं को मद्देनजर रखते हुए आंशिक रूप से आवश्यकतानुसार संशोधन किया जा सकता है।

## शिशु कीटपालन

उत्तरावस्था कीटपालन तथा कोसा उत्पादन पर शिशु कीटपालन प्रभाव को देखते हुए शिशु कीटपालन की ऐसी तकनीक विकसित की गई है, जो कोसा उत्पादन वृद्धि में सहायक होने के साथ-साथ व्यावहारिक भी है। साथ ही, खाद्य पौधों तथा तसर कीट के संवर्धन व व्यवहार पर उसका प्रतिकूल प्रभाव नहीं पड़ता है। इस तकनीक के मुख्य भाग हैं :

(क) **चाकी बागान** : तसर कीटपालन में “चाकी बागान” की अवधारणा एवं तकनीक नई है। चाकी बागान, 4'×4' की दूरी पर उगाये गये चार वर्ष पुराने अर्जुन प्रजाति के पौधों की 3' ऊँचाई पर छंटाई कर तैयार किया जाता है। चाकी बागान के रख-रखाव हेतु उन पौधों में एन.पी.के. 100:50:50 किग्रा/हेक्टेयर/वर्ष की दर से दो किशतों में जून व अगस्त में देना अनुशंसित है। इसके अलावा, गोबर की खाद का अनुप्रयोग चार किग्रा/पौधे/वर्ष की दर से अक्टूबर माह में करना चाहिए।

इस प्रकार विकसित चाकी बागान में 4-6 किग्रा कोमल पत्तियों का उत्पादन प्रति पौधे की दर से किया जा सकता है। ऐसी पत्तियाँ गुणवत्ता में उत्तम होने के कारण शिशु कीटपालन हेतु अधिक उपयुक्त होती हैं। प्रथम व द्वितीय फसल के लिए अलग-अलग चाकी बागान तैयार करना वांछनीय है, जिन्हें बारी-बारी से प्रयोग में लाया जा सकता है।



## महत्वपूर्ण बिन्दु

इस योजना/कार्यक्रम में स्थानीय परिस्थितियों के अनुसार संशोधन किया जा सकता है।

- ❖ पौधारोपण के समूह चाकी बागान व आर्थिक पौधारोपण तैयार किये जा सकते हैं, जिनको कीटपालन के लिए एकान्तर से जैसे प्रथम फसल में उपयोग में लाये गये चाकी बागान को तृतीय फसल के लिए अथवा अगले वर्ष प्रथम फसल के लिए उपयोग में लाया जा सकता है।
- ❖ नाइट्रोजन, फास्फोरस व पोटैश व गोबर खाद का प्रयोग चाकी बागान में करना पर्याप्त है।
- ❖ एन.पी.के. 100:50:50:किग्रा/हे/गोबर खाद 4 किग्रा/पौधा प्रतिवर्ष
- ❖ यूरिया एन 34ग्रा. सिंगल सुपर फास्फेट (एस.एस.पी.) 46 ग्रा. एवं म्युरेट ऑफ पोटैश (के) - 12 ग्रा. प्रति पौधा प्रति वर्ष की दर से
- ❖ 1.5% यूरिया का पत्तियों पर छिड़काव आर्थिक पौधारोपण पर करना पर्याप्त है। (15 ग्रा. यूरिया/लीटर; 1 लीटर घोल = 5 पौधे)
- ❖ चाकी बागान व आर्थिक पौधारोपण दोनों पर 0.09% डाइमिथोएट (रोगर) का छिड़काव। 3 मिली. रोग (30 ई.सी.)/ली - एक लीटर घोल = 5 पौधे)
- ❖ 5% फार्मलीन का घोल, 40% फार्मलीन के एक भाग को सात भाग पानी में मिलाकर बनाया जा सकता है।
- ❖ दो फसलों के आधार पर तैयार इस योजना को परिस्थितियों के अनुसार व्यवस्थित किया जा सकता है।

(ख) कीटपालन उपकरणों का रोगणुनाशन : प्रत्येक कीटपालन के पूर्व, सभी उपकरणों एवं सामग्रियों को फार्मलीन (5%) घोल में डुबाकर रोगणुनाशन किया जाना चाहिए।

(ग) स्वास्थ्यकर परिस्थितियों का रख-रखाव : कीटपालन के पूर्व चाकी बागान की सफाई (निराई इत्यादि) करनी चाहिए। कीटपालन के दौरान कीटपालन गृह में स्वास्थ्यकर परिस्थितियाँ उत्पन्न करने हेतु ब्लीचिंग पाउडर का छिड़काव 4-5 दिनों के अन्तराल पर करना चाहिए।

(घ) अण्डों का उष्मायन : अधिकतम अंडच्छेदन (90-95%) प्राप्त करने के लिए तसर अण्डों का उष्मायन 28°-30° सेग्रे एवं 70-80% आपेक्षिक आर्द्रता में किया जाना चाहिए।

(ङ) नायलोन जाली में चाकी कीटपालन : परभक्षी एवं हानिकारक जीव-जन्तुओं से होनेवाले नुकसान को कम करने के लिए नायलोन की जाली के अन्दर चाकी कीटपालन करना लाभप्रद है।

इस तकनीक में नवस्फुटित रेशमकीटों की ब्रशिंग सीधे चाकी बागान में की जाती है जिसमें इन पौधों को 40'x30'x10' आकार के एक नायलोन की जाली से ढक दिया जाता है, ताकि हानिकारक कीटों से बचाया जा सके। उपरोक्त आकार की एक जाली के अन्दर 4'x4' अन्तराल पर लगे 70 पौधे आ सकते हैं जिनपर 225 रोगमुक्त चकत्तों का द्वितीय अवस्था तक कीटपालन किया जा सकता है। चाकी कीटपालन के समय चाकी

बागान में पत्तियों की गुणवत्ता, कीटों में रोग प्रतिरोधात्मक क्षमता बढ़ाती है तथा नायलोन जाली के कारण परभक्षी व हानिकारक जीव-जन्तुओं से बचाव होता है। परिणामस्वरूप, कोसा उत्पादन लगभग 115 कोसे प्रति रोगमुक्त चकते की दर से बढ़ जाता है। ये कोसे गुणात्मक दृष्टि से भी उत्तम होते हैं।

### उत्तरावस्था कीटपालन

(क) कीटपालन स्थल एवं पौधों का चयन : कीटपालन स्थल ऊँचा होना चाहिए जहाँ पर अर्जुन (टरमिनेलिया अर्जुन) अथवा असन (टरमिनेलिया टोमेन्टोसा) प्रजातियों के पौधों की सघनता हो एवं गुणात्मक दृष्टि से इनकी पत्तियाँ उपयुक्त हों। कीटपालन हेतु जलसंभर स्थल का चयन नहीं करना चाहिए।

(ख) सघन वृक्षारोपण : उत्तरावस्था के रेशम कीटपालन के लिए अर्जुन प्रजाति के सघन वृक्षारोपण जो 4'x4' की अनुशंसित दूरी पर उगाये गये हों, की 5-6 फीट ऊँचाई पर छँटाई कर उपयोग में लाया जाना चाहिए। प्रथम व द्वितीय फसल कीटपालन के लिए अलग-अलग सघन वृक्षारोपण स्थलों का उपयोग करना वांछनीय है, जिन्हें बारी-बारी से उपयोग में लाया जाना चाहिए। पत्तियों के अधिक उत्पादन के लिए पौधों की छँटाई दो वर्षों के अन्तराल पर करनी चाहिए। फसल को दृष्टिगत रखते हुए पौधों की छँटाई प्रथम फसल के लिए जनवरी-फरवरी एवं द्वितीय फसल के लिए मार्च-अप्रैल में करनी चाहिए।

**तालिका : तसर कीटपालन का तुलनात्मक आर्थिक लेखा-जोखा (450 रो.मु.च./हेक्टेयर)**

क्र.सं.	विवरण	परम्परागत तकनीक (रु.)	उन्नत तकनीक (रु.)
<b>(क)</b>	<b>व्यय</b>		
1.	450 रोगमुक्त चकत्तों का मूल्य (रु. 1 प्रति रो.मु.च. की दर से)	450.00	450.00
	शिशु बागान पर शिशु कीटपालन एवं रखरखाव		
2.	एन.पी.के. 100:50:50 किग्रा./हेक्टेयर प्रति वर्ष की दर से (140 पौधों के लिए)	—	60.00
3.	गोबर खाद 4 किग्रा/पौधे की दर से (140 x 4 x 560 किग्रा)	—	650.00
4.	एन.पी.के./गोबर खाद का प्रयोग	—	100.00
5.	शिशु बागान का रखरखाव (निराई-गुड़ाई एवं ठूँठ करना आदि)	—	200.00
6.	2 नायलोन जाली का मूल्य हास (आकार 40'x30'x10') रु. 3500 की दर से (10 फसल तक उपयोग में लाने योग्य)	—	700.00
7.	2 नायलोन जाली लगाने के लिए 20 बांस का मूल्य हास-लागत (10 बांस प्रति जाली) रु. 50 प्रति बांस की दर से (पाँच फसल तक कार्य योग्य)	—	200.00
8.	चाकी बागान के रखरखाव एवं शिशु कीटपालन पर कुल खर्च	—	1910.00
9.	प्रति हेक्टेयर सघन पौधारोपण का रखरखाव	1200.00	1200.00
10.	विविध (कीटनाशक, 1.5% यूरिया, फार्मलीन, बी.एच.सी., ब्लीचिंग पाउडर आदि)	500.00	500.00
11.	मजदूरी (80 श्रम दिवस प्रति 100 रो.मु.च. की दर से परम्परागत तकनीक में 360 श्रम-दिवस जबकि उन्नत तकनीक में 340 श्रम दिवस)	10800.00	10200.00
12.	कुल खर्च	12950.00	14260.00
<b>(ख)</b>	<b>उत्पादन</b>		
13.	200 अण्डे प्रति रोगमुक्त चकत्ते; 80% अंडस्फुटन; परम्परागत तकनीक में 50 कोसे तथा उन्नत तकनीक में 65 कोसे प्रति रो.मु.च.	22500 कोसे	29250 कोसे
14.	कोसों की बिक्री (औसतन रु. 0.65 प्रति कोसे की दर से)	22500.00	29250.00
<b>(ग)</b>	<b>शुद्ध लाभ (14-12)</b>	1675.00	4752.50 या 4752.00
<b>(घ)</b>	<b>कीटपालन परिवार का कुल आय [(मजदूरी (11) + शुद्ध लाभ (ग))]</b>	12475.00	14950.00
♦	1 हेक्टेयर = आर्थिक पौधारोपण (4'x4') = 6724 पौधे		
♦	1 हेक्टेयर = 450 रो.मु.च. = 14 चाकी पौधे (4'x4') 2240 वर्गफीट		
♦	उपर्युक्त आंकलन 4 वर्ष पुराने अर्जुन पौधारोपण के आधार पर किया गया है।		
♦	परम्परागत तकनीक : आर्थिक पौधारोपण पर कीटपालन।		
♦	उन्नत तकनीक : चाकी बागान पर नायलोन जाली से ढक कर तत्पश्चात् तथा आर्थिक पौधारोपण पर उत्तरावस्था कीटपालन।		

(ग) पत्तियों में वृक्षव्रण की रोकथाम

(i) पत्तियों में वृक्षव्रण (गॉल) के प्रकोप की रोकथाम हेतु 0.09% डायमथोएट (रोगर) का छिड़काव पत्तियों के अँखुआ निकलने के पश्चात् 15 दिन के अन्तराल पर तीन बार करना अपेक्षित है। इससे रोग के प्रकोप को 70-80% तक कम किया जा सकता है। 3 मि.ली. रोगर/लीटर की दर से, 1 लीटर घोल 5 पौधों के लिए पर्याप्त है।

(ii) कीटपालन के पूर्व शाखाओं की अग्र कोमल पत्तियाँ नष्ट कर देनी चाहिए क्योंकि वृक्षव्रण के कीट उन पर ही अंडे देते हैं।

(घ) पत्तियों पर यूरिया का छिड़काव : पत्तियों के गुणात्मक एवं परिमाणात्मक सुधार हेतु यूरिया (1.5%) खाद का छिड़काव रेशम कीटपालन के 15 दिन पूर्व किया जाना चाहिए। 15ग्रा. यूरिया/लीटर की दर से 1 लीटर घोल 5 पौधों के लिए पर्याप्त



है। अतः, 1 हेक्टेयर सघन वृक्षारोपण (4'x4') के लिए 20 किग्रा. खाद की आवश्यकता होगी।

(ड) रेशमकीटों का स्थानान्तरण

(i) चाकी बागान में पालित रेशमकीटों को द्वितीय निर्मोक के बाद (24 घंटे के अन्दर) शाखाओं सहित सघन वृक्षारोपण पर प्रातः या सांयकाल की शीतल वेला में स्थानान्तरित किया जाना चाहिए।

(ii) इस दौरान रेशमकीटों को पौधों पर एकसमान ढंग से वितरित किया जाना चाहिए।

(iii) एक पौधे पर रेशम कीटों की अनुशंसित संख्या रखी जानी चाहिए ताकि स्थानान्तरण कम-से-कम करना पड़े।

(च) स्वास्थ्यकर परिस्थितियों का रख-रखाव : कीटपालन से पूर्व चयनित स्थल की सफाई (निराई आदि) की जानी चाहिए, ताकि हानिकारक कीट एवं पिछली फसल के बचे कुड़ा-कंकट को हटाया जा सके। पौधों के नीचे गिरे रेशमकीट के अवशेष एवं मल, गौण संक्रमण के मुख्य स्रोत हैं। अतः, इन्हें कीटपालन स्थल से दूर सावधानीपूर्वक जमीन में गाड़ देना चाहिए।

(छ) निर्मोक व कोसा निर्माण के दौरान एवं परभक्षी व हानिकारक जीव-जंतुओं से रेशमकीटों की देखभाल

(i) निर्मोक एवं कोसा निर्माण के दौरान रेशमकीटों से छेड़छाड़ नहीं करनी चाहिए।

(ii) कीटपालन अवधि में सूर्योदय से सूर्यास्त तक कड़ी देख-रेख की जानी चाहिए ताकि रेशमकीटों को परभक्षी एवं हानिकारक जीव-जंतुओं से बचाया जा सके।

(iii) चींटियों से बचाव के उपाय भी करने चाहिए।

(ज) रोगों से बचाव व उनकी रोकथाम

(i) रेशमकीटों को जीवाणु जनित (बैक्टेरिओसिस) एवं विषाणु जनित (वायरसिस) जैसे रोगों से बचाने के लिए एसिफोर 1.5% (15 मिली.) अथवा सोडियम हाइपोक्लोराइट 0.01% (2.5 मिली.) के घोल का छिड़काव कीटों की त्वचा के ऊपर तृतीय व चतुर्थ अवस्था में एक-एक बार व पंचम अवस्था में दो बार (7 दिनों के अन्तराल पर) करना चाहिए।

(ii) रेशमकीटों पर रसायन का छिड़काव स्प्रेयर द्वारा उनके स्थानान्तरण के पूर्व करना चाहिए। (1 लीटर घोल = 5 पौधे/2000 शिशु कीट या 1000 उत्तरावस्था कीट)

(iii) जीवाणु/विषाणु एवं फफूंद जनित रोगों से बचाव के लिए रेशमकीटों पर निर्मोक के 24 घंटे के पश्चात् तसर कीट औषध चूर्ण का छिड़काव मसलिन कपड़े से करना चाहिए। इसके लिए नव निर्मोचित रेशमकीटों को स्थानान्तरण के पूर्व एकत्रित कर द्वितीय, तृतीय एवं चतुर्थ अवस्था में एक-एक बार (50ग्रा/1000 रेशमकीट की दर से) व पंचम अवस्था में दो बार (5-6 दिन के अन्तराल पर) (100 ग्रा/1000 रेशमकीट की दर से) छिड़काव करना चाहिए।

(झ) कोसा कटाई एवं भंडारण

(i) कोसों की कटाई उनके निर्माण के 6-10 दिन पश्चात् (शंखी/प्युपा बनने के बाद) करना चाहिए।

(ii) कोसों पर चिपकी हुई पत्तियाँ साफ कर देनी चाहिए।

(iii) कमजोर/चूहों से एवं अन्य तरह से क्षतिग्रस्त कोसों को हटाकर अलग रखना चाहिए।

(iv) बीज योग्य कोसों की माला (100 कोसे/माला) को बीजागार भवन में अनुकूल परिस्थितियों में परिरक्षित किया जाना चाहिए।

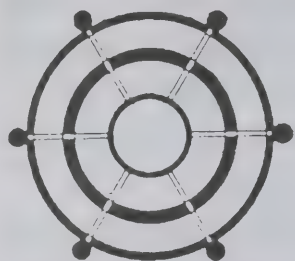
(v) वणिज्यिक कोसों को सूर्य के प्रकाश में सुखाकर बोरों में ढिलाई से भरकर रखना चाहिए ताकि लम्बे समय तक उनका भंडारण किया जा सके।

### सावधानियाँ

तसर कीटपालन में निम्नलिखित सावधानियाँ आवश्यक हैं:

- ◆ कीटपालन प्रक्षेत्र में सफाई हो। मरे हुए कीटों को प्रक्षेत्र से बाहर दफनाया जाए।
- ◆ नाशक कीटों तथा चिड़ियों से तसर कीटों की सुरक्षा की जाए।
- ◆ प्रक्षेत्र में हाथों के निःसंक्रमण के लिए फार्मलीन का घोल रखा जाए।
- ◆ पत्ते समाप्त हो जाने पर कीटों को एक पौधे से दूसरे पर स्थानान्तरित किया जाए।
- ◆ एक पौधे पर एक ही अवस्था के तसरकीट हों।
- ◆ प्रत्येक तसर कीट को पर्याप्त धूप मिले।
- ◆ कीटों को उनकी अवस्था के अनुरूप पत्ते मिलें।
- ◆ कोसा सृजन के समय प्रक्षेत्र की विशेष सुरक्षा का ध्यान रखा जाए।
- ◆ यथासंभव आसपास तरीख के अंडच्छेदित कीटों का पालन किया जाए। इससे वे करीब-करीब एक साथ पकते हैं और कीटपालन में कम श्रम लगता है।

लेखकगण केन्द्रीय तसर अनुसंधान व प्रशिक्षण संस्थान, रांची में कार्यरत हैं।



# Exports Review

Foreign exchange earnings of the Indian silk industry during the month of February '98 amounted to Rs. 8433.10 lakh compared to Rs. 6931.08 lakh during February '97.

During April '97 to February

## Review of Silkgoods Certified for Exports

During February 1998 and April '97 to February '98 period of the year 1997-98

TABLE - I

### Export Performance of Indian Silk Industry

(Unit : Lakh ; Qty : Silkgoods ; Sq. Mtrs. ; Silkyarn/Silkwaste : Kg ; Value : Rs.)

Item of Export	February				% Increase		April to February				% Increase	
	1998		1997				1997-98		1996-97			
	Qty.	Value	Qty.	Value	Qty.	Value	Qty	Value	Qty.	Value	Qty.	Value
A. Silkgoods :												
(1) Mulberry												
(i) Dress Material	16.03	3407.58	18.67	3010.99	-14.1	13.2	176.15	32286.99	187.67	30790.27	-6.1	4.9
(ii) Readymade Garments	4.18	1531.99	4.89	1120.87	-14.5	36.7	48.03	15054.38	87.76	19183.90	-45.3	-21.5
(iii) Carpets	0.11	1399.90	0.09	897.77	22.2	55.9	1.33	11035.61	0.92	8101.89	44.6	36.2
(iv) Sarees	1.17	268.89	2.78	485.47	-57.9	-44.6	26.30	5648.08	31.57	5902.54	-16.7	-4.3
(v) Scarves/stoles	4.11	646.71	6.59	643.82	-37.6	0.4	54.96	6233.73	74.11	7180.18	-25.8	-13.2
(vi) Others	2.65	613.87	2.53	358.31	4.7	71.3	26.93	5870.00	29.25	4819.28	-7.9	21.8
Mulberry Total [i to vi]	28.25	7868.94	35.55	6517.23	-20.5	20.7	333.70	76128.79	411.28	75978.06	-18.9	0.2
(2) Tasar	0.68	112.55	0.58	90.22	17.2	24.8	9.06	1421.51	9.39	1590.07	-3.5	-10.6
Total [1+2]@	28.93	7981.49	36.13	6607.45	-19.9	20.8	342.76	77550.30	420.67	77568.13	-18.5	-0.0
(3) Mixed/Blended	1.12	142.21	1.64	210.06	-31.7	-32.3	21.53	2879.54	19.37	2077.98	11.2	38.6
Total [1+2+3]	30.05	8123.70	37.77	6817.51	-20.4	19.2	364.29	80429.84	440.04	79646.11	-17.2	1.0
B. SILKYARN	-	-	-	-			0.25	93.24	0.04	43.42		
C. SILKWASTE	1.59	309.40	0.74	113.57			8.47	1569.73	1.26	186.41		
TOTAL [A+B+C]		8433.10		6931.08		21.7		82092.81		79875.94		2.8

@ Refers to total natural silk goods exports

'98 period of the year 1997-98, foreign exchange earnings from silkgoods certified for exports amounted to Rs. 82092.81 lakh as against Rs. 79875.94 lakh during the corresponding period of previous year and reflected an

uptrend of 2.8%.

Data on itemwise silkgoods certified for exports by Central Silk Board are given in Table-I.

Comparative data on region-wise silkgoods certified for exports

are given in Table-II.

### Natural silkgoods

During February '98, the natural silkgoods certified for exports amounted to 28.93 lakh sq. mtrs. valued at Rs. 7981.49 lakh as

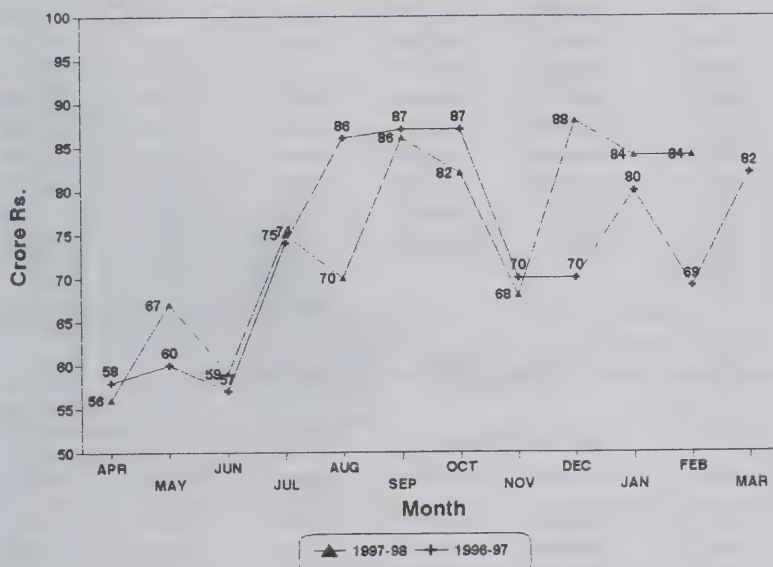


**Table - II**  
**Regionwise Silkgoods certified for exports**

[Unit:Lakh;Qty:Sq.mtrs;Value:Rs.]

Region	February						April to February					
	1998		1997		% Increase		1997-98		1996-97		% Increase	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
West Europe	14.80	4067.86	16.40	3099.39	-9.8	31.2	153.64	35145.27	177.76	32550.72	-13.6	8.0
U.S.A. & Others	10.27	2969.02	11.29	2304.87	-9.0	28.8	122.25	29515.63	159.93	31362.68	-23.6	-5.9
Asia	3.95	732.05	8.36	1165.75	-52.8	-37.2	69.02	11390.33	76.60	11221.15	-9.9	1.5
Japan & Others	0.67	261.89	1.26	160.83	-46.8	62.8	7.06	2033.67	9.61	2167.73	-26.5	-6.2
Africa	0.17	61.28	0.41	79.10	-58.5	-22.5	5.95	1737.16	6.41	1303.41	-7.2	33.3
East Europe	0.19	31.60	0.05	7.57	280.0	317.4	6.37	607.78	9.73	1040.42	-34.5	-41.6
Total	30.05	8123.70	37.77	6817.51	-20.4	19.2	364.29	80429.84	440.04	79646.11	-17.2	1.0

### Certified Silk Export Earnings



against 36.13 lakh sq. mtrs. valued at Rs. 6607.45 lakh during the corresponding month of previous year.

During April '97 to February '98 period of the year 1997-98, the aggregate natural silkgoods certified for exports amounted to 342.76 lakh sq. mtrs. valued at Rs. 77550.30 lakh as against 420.67 lakh sq. mtrs. valued at Rs. 77568.13 lakh during the corresponding period of preceding year.

### Mulberry silkgoods

During February '98, mulberry silkgoods certified for exports amounted to 28.25 lakh sq.mtrs.

**Table - III**  
**Centrewise/Varietywise Silkgoods/Silkyarn/Silkwaste certified for exports during April '97 to February '98 period of the year 1997-98**

[Unit:Lakh;Qty:Silkgoods:Sq.mtrs;Silkyarn/Silkwaste:Kg;Value:Rs.]

Centre	Mulberry		Tasar		Mixed Blended		Sub-Total		% Share		Silkyarn		Silkwaste		Grand Total Value	% Share of Centre
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value		
Mumbai	37.26	8653.09	2.09	442.06	3.35	700.37	42.70	9795.52	11.7	12.2	0.10	24.29	0.00	0.00	9819.81	12.0
Bangalore	122.39	22487.68	0.59	92.85	6.53	318.36	129.51	22898.89	35.6	28.5	0.03	33.37	0.26	28.75	22961.01	28.0
Bhagalpur	11.15	1603.06	1.03	187.54	2.49	249.82	14.67	2040.42	4.0	2.5	0.00	0.00	0.00	0.00	2040.42	2.5
Chennai	10.12	2792.04	0.13	27.69	1.33	185.73	11.58	3005.46	3.2	3.7	0.00	0.00	8.09	1518.61	4524.07	5.5
Calcutta	44.88	8104.74	3.29	416.78	1.41	79.36	49.58	8600.88	13.6	10.7	0.12	35.58	0.11	22.37	8658.83	10.5
New Delhi	97.27	30883.22	1.61	197.37	0.48	75.52	99.36	31156.11	27.3	38.7	0.00	0.00	0.00	0.00	31156.11	38.0
Varanasi	5.38	739.03	0.32	57.22	5.94	1270.38	11.64	2066.63	3.2	2.6	0.00	0.00	0.00	0.00	2066.63	2.5
Srinagar	4.46	743.01	0.00	0.00	0.00	0.00	4.46	743.01	1.2	0.9	0.00	0.00	0.00	0.00	743.01	0.9
Hyderabad	0.79	122.92	0.00	0.00	0.00	0.00	0.79	122.92	0.2	0.2	0.00	0.00	0.00	0.00	122.92	0.1
Total	333.70	76128.79	9.06	1421.51	21.53	2879.54	364.29	80429.84	100.0	100.0	0.25	93.24	8.47	1569.73	82092.81	100.0

**Table - IV**  
**Foreign Exchange Earnings from Mulberry Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	February		%	April to February		%	Country Share Percentage in	
	1998	1997		1997-98	1996-97		1997-98	1996-97
U.S.A.	2542.22	2035.65	24.9	25440.89	27418.93	-7.2	33.4	36.1
Germany	1175.43	967.17	21.5	11603.77	11039.29	5.1	15.2	14.5
U.K.	840.87	618.47	36.0	7699.29	7657.42	0.5	10.1	10.1
France	572.24	399.81	43.1	4082.84	2984.48	36.8	5.4	3.9
Italy	397.87	223.55	78.0	3249.93	2194.17	48.1	4.3	2.9
U.A.E.	122.69	257.94	-52.4	2287.01	2218.83	3.1	3.0	2.9
Canada	225.94	160.15	41.1	2239.37	2296.30	-2.5	2.9	3.0
Hong Kong	149.94	279.10	-46.3	1998.76	2102.83	-4.9	2.6	2.8
Singapore	76.12	231.08	-67.1	1734.56	2035.37	-14.8	2.3	2.7
Netherlands	180.56	144.60	24.9	1496.83	1667.08	-10.2	2.0	2.2
Denmark	137.64	83.52	64.8	1000.28	702.91	42.3	1.3	0.9
Australia	124.60	86.19	44.6	958.97	1105.80	-13.3	1.3	1.5
Spain	192.26	93.76	105.1	943.27	890.14	6.0	1.2	1.2
Switzerland	157.07	155.51	1.0	943.09	1002.74	-5.9	1.2	1.3
Thailand	103.84	2.45	4138.4	729.52	247.19	195.1	1.0	0.3
Japan	122.55	42.16	190.7	706.11	688.59	2.5	0.9	0.9
Mauritius	22.75	7.31	211.2	669.97	369.20	81.5	0.9	0.5
Belgium	78.87	71.06	11.0	572.25	696.39	-17.8	0.8	0.9
Austria	70.57	49.11	43.7	514.34	730.55	-29.6	0.7	1.0
Malaysia	18.22	55.72	-67.3	505.83	503.98	0.4	0.7	0.7
Others	556.69	552.92	0.7	6751.91	7425.87	-9.1	8.9	9.8
Total	7868.94	6517.23	20.7	76128.79	75978.06	0.2	100.0	100.0

@ Refers to top 20 importing countries

**Table - V**  
**Foreign Exchange Earnings from Tasar Silkgoods Certified for Exports**

(Rs. in Lakh)

Country @	February		%	April to February		%	Country Share Percentage in	
	1998	1997		1997-98	1996-97		1997-98	1996-97
Germany	7.31	23.27	-68.6	240.41	345.22	-30.4	16.9	21.7
U.S.A.	19.35	16.22	19.3	224.42	300.57	-25.3	15.8	18.9
France	18.93	13.44	40.8	166.60	77.50	115.0	11.7	4.9
Hong Kong	11.93	0.87	1271.3	130.66	15.31	753.4	9.2	1.0
U.A.E.	11.55	17.14	-32.6	122.77	169.32	-27.5	8.6	10.6
Japan	0.73	3.11	-76.5	85.48	137.72	-37.9	6.0	8.7
Italy	1.07	3.08	-65.3	57.77	62.81	-8.0	4.1	4.0
Spain	10.95	0.39	2707.7	48.55	17.00	185.6	3.4	1.1
U.K.	2.01	1.54	30.5	44.99	105.63	-57.4	3.2	6.6
Brazil	2.13	0.17	1152.9	44.36	23.80	86.4	3.1	1.5
Kuwait	-	-	-	23.95	27.42	-12.7	1.7	1.7
Belgium	0.28	0.42	-33.3	21.03	4.36	382.3	1.5	0.3
Turkey	0.27	-	-	19.57	10.10	93.8	1.4	0.6
Portugal	11.33	0.19	5863.2	19.10	18.05	5.8	1.3	1.1
Canada	0.77	2.39	-67.8	16.21	33.25	-51.2	1.1	2.1
Argentina	1.52	-	-	16.13	2.14	653.7	1.1	0.1
Saudi Arabia	-	-	-	14.71	12.88	14.2	1.0	0.8
South Africa	-	0.15	-100.0	14.38	11.12	29.3	1.0	0.7
Afghanistan	-	-	-	11.79	10.79	9.3	0.8	0.7
Netherlands	4.27	-	-	10.80	6.73	60.5	0.8	0.4
Others	8.15	7.84	4.0	87.83	198.35	-55.7	6.2	12.5
Total	112.55	90.22	24.8	1421.51	1590.07	-10.6	100.0	100.0

@ Refers to top 20 importing countries

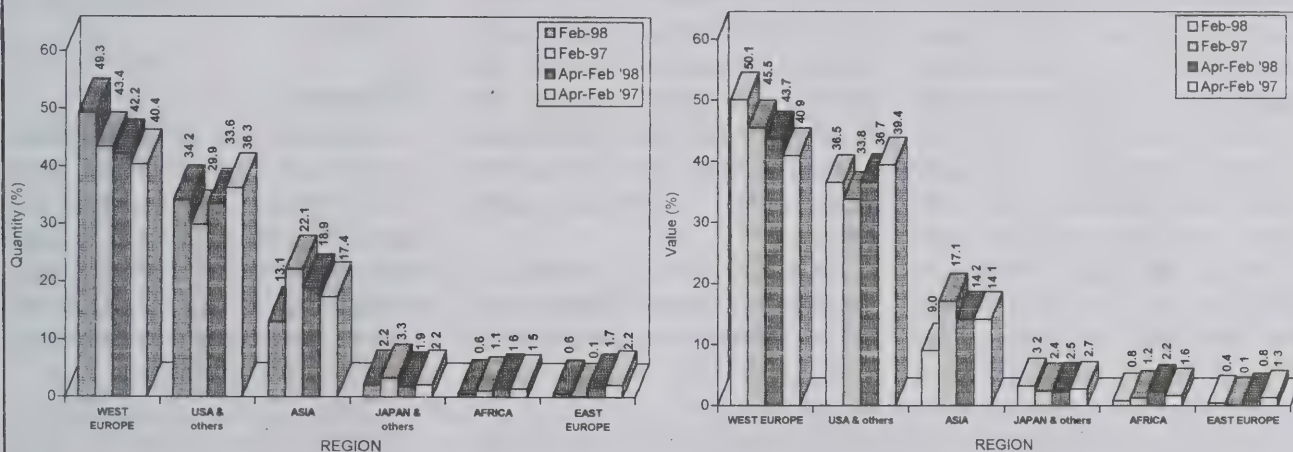


**Table - VI**  
**Unit Export Price**

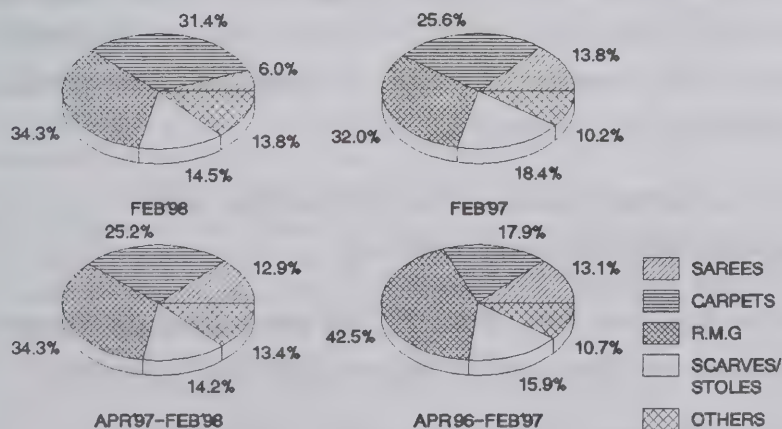
(Rs. per Sq.mtr.)

Item	February			April-February		
	1998	1997	% Increase	1997-98	1996-97	% Increase
<b>A. Mulberry Silkgoods</b>						
1. Excl. Carpets	229.86	158.48	45.0	195.84	165.41	18.4
2. Incl. Carpets	278.55	183.32	51.9	228.13	184.74	23.5
3. Carpets	13138.41	9771.10	34.5	8296.64	8759.27	-5.3
<b>B. Tasar Silkgoods</b>	166.50	155.27	7.2	157.00	169.34	-7.3

### REGION-WISE SILKGOODS CERTIFIED FOR EXPORTS



### Share percentage of Varietywise Mulberry Silkgoods Export Earnings



valued at Rs. 7868.94 lakh as against 35.55 lakh sq. mtrs. valued at Rs. 6517.23 lakh during February '97.

During April '97 to February '98 period of the year 1997-98, mulberry silkgoods certified for exports amounted to 333.70 lakh sq. mtrs. valued at Rs. 76128.79 lakh compared with 411.28 lakh sq. mtrs. valued at Rs. 75978.06 lakh during the corresponding period of 1996-97. Out of the total natural silkgoods certified for exports, the share of mulberry silkgoods roughly amounted to 97% in quantity and 98% in value.

Countrywise data of mulberry silkgoods certified for exports is given in Table-IV.

### **Varietywise mulberry silkgoods**

During April '97 to February '98 period of the year 1997-98, among the various varieties of mulberry silkgoods certified for exports, dress materials ranked first followed by readymade garments, carpets, sarees and scarves/stoles. Data of varietywise mulberry silkgoods certified for exports are given in Table-I.

### **Tasar silkgoods**

During February '98, tasar silkgoods certified for exports amounted to 0.68 lakh sq.mtrs. valued at Rs. 112.55 lakh compared with 0.58 lakh sq.mtrs. valued at Rs. 90.22 lakh during February '97.

During April '97 to February '98 period of the year 1997-98, a total quantity of 9.06 lakh sq. mtrs. of tasar silkgoods valued at Rs. 1421.51 lakh were certified for exports as against 9.39 lakh sq. mtrs. valued

at Rs. 1590.07 lakh during the corresponding period of previous year.

Countrywise data of tasar silkgoods certified for exports are given in Table-V.

### **Unit export price**

The unit export price realised for mulberry and tasar silkgoods during February '98 and April '97 to February '98 period of the year 1997-98 along with comparative data of previous year are given in Table-VI.

### **Mixed or blended silkgoods**

During February '98, mixed/blended silkgoods certified for exports amounted to 1.12 lakh sq.mtrs. valued at Rs. 142.21 lakh compared with 1.64 lakh sq. mtrs. valued at Rs. 210.06 lakh during February '97.

Mixed/blended silkgoods certified for exports during April '97 to February '98 period of the year 1997-98 amounted to

21.53 lakh sq. mtrs. valued at Rs. 2879.54 lakh compared with 19.37 lakh sq. mtrs. valued at Rs. 2077.98 lakh in the corresponding period of previous year and reflected an increase of 11.2% in quantity and 38.6% in value.

### **Silkyarn**

About 25 tons of spun and noil silk yarn valued at Rs. 93.24 lakh has been certified for exports during April '97 to February '98 period of the year 1997-98 as against 4 tons valued at Rs. 43.42 lakh in the corresponding period of 1996-97.

### **Silkwaste**

Silkwaste and its bye-products certified for exports during April '97 to February '98 period of the year 1997-98 amounted to 847 tons valued at Rs. 1569.73 lakh as against 126 tons valued at Rs. 186.41 lakh in the corresponding period of previous year.

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# Silk Prices

February 1998

## Raw Silk : Volume of Transaction

At all the silk exchanges established in Karnataka, a total quantity of 133.984 tons of all qualities of raw silk valued at Rs.1472.212 lakh was transacted during the month of February '98 as against a quantity of 134.727 tons

Bangalore Silk Exchange alone accounted for 78% and 74% in both quantity and value, respectively.

During the first eleven months period of the year 1997-98 (i.e., April '97 to February '98) at Bangalore Silk Exchange, a total quantity of 1222.364 tons of all qualities of raw silk valued at Rs. 12096.988 lakh was transacted. The volume of trade at

Bangalore Silk Exchange during the period April '97 to February '98 accounted for 79.6% in quantity and 75.7% in value of the total transaction in all silk exchanges of the State.

Data on qualitywise transaction of raw silk at Bangalore Silk Exchange *vis-a-vis* at all silk exchanges in Karnataka during February '98, February '97, April '97 to

**Table I. Transaction of Raw Silk at Bangalore Silk Exchange**

Raw Silk Quality	(Qty. : Ton, Value : Lakh Rs.)							
	February '98		February '97		April '97-February '98		April '96-February '97	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Filature/ Cottage Basin	23.348 (43.919)+	309.807 (585.181)	19.984 (39.438)	281.811 (546.428)	233.944 (442.163)	3067.587 (5798.368)	235.580 (422.298)	3156.171 (5620.388)
Charka	55.999 (64.594)	629.477 (735.329)	64.302 (78.044)	791.946 (962.702)	718.170 (814.924)	7519.974 (8609.465)	712.600 (840.562)	8002.301 (9494.054)
Dupion	25.156 (25.471)	149.538 (151.702)	16.976 (17.245)	127.280 (129.588)	270.250 (279.003)	1509.427 (1573.061)	242.895 (244.490)	1481.259 (1492.018)
Total	104.503 (133.984)	1088.822 (1472.212)	101.262 (134.727)	1201.037 (1638.718)	1222.364 (1536.070)	12096.988 (15980.894)	1191.075 (1507.350)	12639.731 (16606.460)

+ Figures in bracket refer to total transaction at all the Silk Exchanges in Karnataka

valued at Rs. 1638.718 lakh during February '97. During the first eleven months period of the year 1997-98 (i.e., April '97 to February '98), at all silk exchanges in Karnataka, a total quantity of 1536.070 tons valued at Rs. 15980.894 lakh was transacted as against 1507.350 tons valued at Rs. 16606.460 lakh of the preceding year.

## Bangalore Silk Exchange

At Bangalore Silk Exchange alone, which is the largest Silk exchange in Karnataka, a total quantity of 104.503 tons of all qualities of raw silk *viz.*, filature/cottage basin, charka and dupion, valued at Rs. 1088.822 lakh was transacted during February '98 as compared to 1191.075 tons valued at Rs. 12639.731 lakh during February '97. Of the above transaction in Karnataka State, the volume of transaction at

**Table II. Transaction of raw silk of different deniers of raw silk at Bangalore Silk Exchange during February '98**

Denier	Quality	Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
				Min.	Max.	Avg.
13/15	Fine	847	1156313	1275	1400	1365
14/16	Fine	858	1149841	1305	1480	1340
16/18	Fine	3613	4790728	1080	1440	1326
18/20	Medium	5911	7746821	950	1530	1311
20/22	Medium	8134	10910767	965	1530	1341
22/24	Medium	52	66150	1200	1350	1272
24/26	Medium	300	385148	1200	1350	1284
26/28	Coarse	1626	2295289	1105	1575	1412
28/30	Coarse	1077	1278935	1050	1555	1187
30/32	Coarse	931	1200692	1050	1575	1290

**Table IIa. Transaction of Charka raw silk of different varieties at Bangalore Silk Exchange during February '98**

Varieties	Qty. (Kg.)	Value (Rs.)	Price (Rs./Kg.)		
			Min.	Max.	Avg.
Coarse	1727	1495085	550	1070	866
Medium	3959	3536177	680	1150	893
Fine	50314	57916409	850	1380	1151



**Table III. Prices of Indigenous Silk**

Silk Exchange	Variety	(Rs./Kg)					
		February '98			February '97		
		Min	Max	Avg	Min	Max	Avg
Bangalore Silk Exchange (Karnataka)	Filature/Cottage Basin	950	1575	1327	510	1650	1410
	Charka	550	1380	1124	500	1465	1232
	Dupion	160	860	594	360	970	750
Anna Silk Exchange, Kanchipuram Market (Tamil Nadu)	Filature/Cottage Basin	1100	1380	1284	1250	1465	1368
	Charka	905	1150	1025	950	1150	1074

**Table III (contd). Imported Silk (Varanasi Market)**

Filature Silk 20/22 dr.	(Rs./Kg)			
	February '98		February '97	
	Min	Max	Min	Max
Chinese	1540	1590	1450	1550
Korean	1530	1580	1400	1500

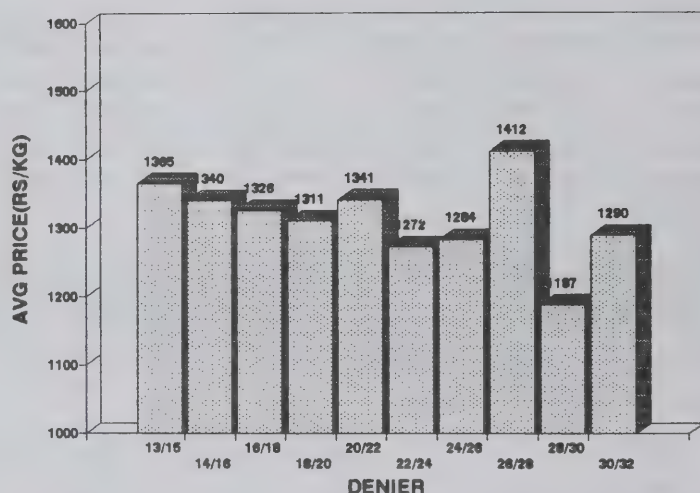
February '98 and April '96 to February '97 are given in Table-I. The transaction of raw silk of different deniers of filature/cottage basin rawsilk at Bangalore Silk Exchange during February '98 is given in Table-II. Qualitywise charka rawsilk transaction during February '98 are given in Table-IIa.

#### Prices of sericultural commodities

The prices of different qualities of indigenous raw silk ruled at Bangalore Silk Exchange (Karnataka) and Anna Silk Exchange (Tamil Nadu) in addition to prices of imported raw silk at Varanasi market during February '98 in comparison with February '97 are given in Table - III.

The prices of different varieties of mulberry reeling cocoons quoted at important cocoon markets of southern states viz., Karnataka, Tamil Nadu and Andhra Pradesh are given in Table IV.

**Average Prices of Denierwise Filature Raw Silk Transacted at Bangalore Silk Exchange**

**Table IV. Mulberry Reeling Cocoon Prices**

State	Market	Variety	(Rs./kg.)			
			February '98		February '97	
			Min	Max	Min	Max
Karnataka	Ramanagaram	Imp. cross breed	90	157	95	168
	T. Narasipur	Ord. cross breed	42	90	43	110
Tamil Nadu	Vaniyambadi	Imp. cross breed	70	133	80	153
	Coimbatore	Imp. cross breed	70	157	92	167
Andhra Pradesh	Hyderabad	Multivoltine	42	143	57	152
	Dharmavaram	Multivoltine	81	163	70	175

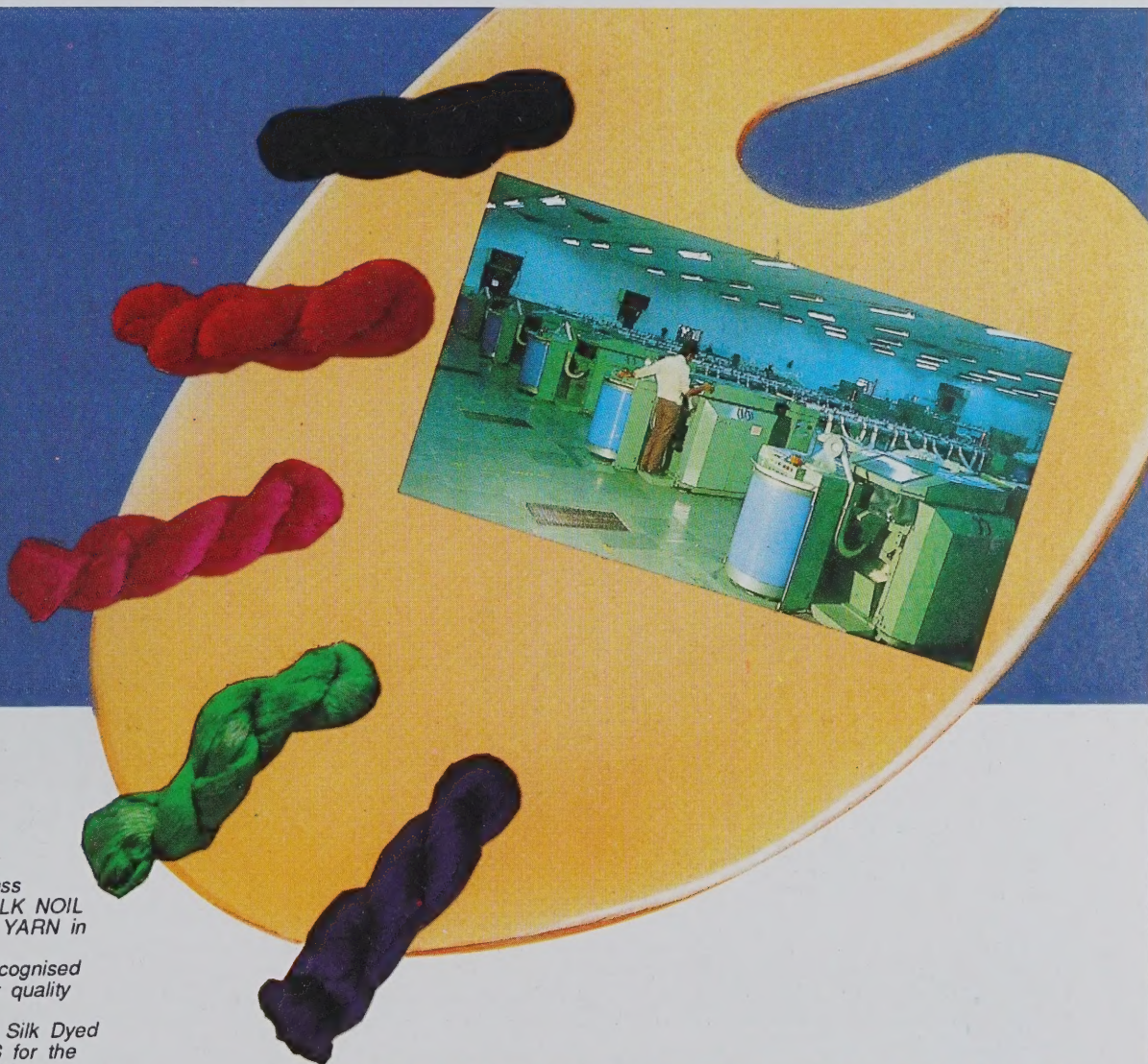
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